

THE
SURGICAL CLINICS
OF
NORTH AMERICA

JUNE, 1927

VOLUME 7 — NUMBER 3

CHICAGO NUMBER

PHILADELPHIA AND LONDON

W. B. SAUNDERS COMPANY

COPYRIGHT 1927, W. B. SAUNDERS COMPANY. ALL RIGHTS RESERVED.
PUBLISHED BI-MONTHLY (SIX NUMBERS A YEAR) BY W. B. SAUNDERS COMPANY, WEST W
SQUARE, PHILADELPHIA

MADE IN U. S. A.

CONTRIBUTORS TO THIS NUMBER

- EDMUND ANDREWS M. D. Assistant Professor of Surgery University of Illinois College of Medicine Attending Surgeon St. Luke's Hospital
- W. T. BELFIELD M. D., Professor of Surgery (Genito-urinary), Rush Medical College University of Chicago
- ARTHUR DEAN BEVAN M. D. Clinical Professor of Surgery Rush Medical College University of Chicago Surgeon Presbyterian Hospital
- J. R. BUCHBINDER M. D. Assistant Professor of Surgery Northwestern University Medical School Attending Surgeon Cook County Hospital, Associate Attending Surgeon Wesley Memorial Hospital
- FREDERICK CHRISTOPHER M. D. Surgeon Evanston Hospital Evanston Illinois Associate in Surgery at the Medical School Northwestern University
- EDWARD LYMAN CORNELL M. D. Assistant Professor of Obstetrics Northwestern University Medical School Attending Obstetrician Chicago Lying In Hospital
- H. HOYT COX M. D. Clinical Surgeon Northwestern University Medical School Surgeon Wesley Memorial Hospital
- CARL B. DAVIS M. D. Associate Professor of Surgery Rush Medical College University of Chicago Associate Surgeon Presbyterian Hospital
- LOYAL DAVIS M. D. Associate Professor of Surgery Northwestern University Medical School Attending Neurologic Surgeon Wesley Memorial and Children's Memorial Hospitals Attending Surgeon Cook County Hospital
- GEORGE DE TARNOVSKY M. D. Associate Professor of Surgery University of Illinois School of Medicine Attending Surgeon Ravenswood Hospital
- DANIEL N. FISENDRATH M. D. Assistant Professor of Genito-urinary Surgery Rush Medical College University of Chicago Attending Urologist Michael Reese and Chicago Memorial Hospitals
- DR. GATEWOOD Assistant Clinical Professor of Surgery Rush Medical College University of Chicago Associate Attending Surgeon Presbyterian Hospital
- J. P. GREENHILL M. D. Attending Obstetrician Chicago Lying In Hospital and Dispensary Attending Gynecologist Cook County Hospital Associate in Obstetrics Northwestern University Medical School
- JEROME R. HEAD M. D. Instructor in Surgery University of Illinois School of Medicine
- ROBERT H. HERBST M. D. Associate Clinical Professor of Surgery (Genito-urinary),

HUGH N. MacKECHNIE M. D., Professor of Surgery Post Graduate Hospital and Medical School Attending Surgeon Post Graduate South Shore and Illinois Masonic Hospitals

Hospital

FREDERICK B. MOORHEAD M. D. Associate Professor of Surgery (Oral and Dental) Rush Medical College University of Chicago, Attending Oral Surgeon Presbyterian Hospital

HAROLD BOLIN M. D. Assistant Professor of Surgery Northwestern University Medical School Attending Surgeon Cook County Hospital

ED

CONTENTS

Clinic of Dr Arthur Dean Bevan	Presbyterian Hospital		469
MELANOTIC TUMOR OF THE BRAIN			469
TWO CASES OF HEAD INJURY			481
Clinic of Dr Golder L McWhorter	Presbyterian Ho pital		
OPERATION ON TWO CASES OF SECONDARY CARCINOMA AND ON ONE CASE OF PRIMARY CYST ADENOMA OF THE PAROTID GLAND RELATION OF THE LOBES OF THE PAROTID TO THE FACIAL NERVE			489
EPIDEMIC ACUTE SPASTIC COLITIS SIMULATING ACUTE APPENDICITIS OR INTUSSUSCEPTION ASSOCIATION WITH CERVICAL ADHESITS AND SLIGHT PHARYNGITIS PROBABLY ONE TYPE OF SO-CALLED INTESTINAL INFLUENZA A POSSIBLE FACTOR IN EPIDEMIC AP PENDICITIS			507
Clinic of Dr Frederick B Moorhead	Presbyterian Ho p ital		
OSSIFYING FIBROMA			517
Clinic of Dr Carl B Davis	Presbyterian Hospi al		
CARCINOMA OF THE LOWER BOWEL			525
FOUR CASES OF TRAUMATIC INTESTINAL INJURY			529
CYST OF THE CEREBELLUM			533
Clinic of Dr Gatewood	Presbyterian Hospital		
PLASTICS OF THE FACE AND JAW			539
Clinic of Dr Francis Howe Straus	Presby erian Hospital		
CARPAL INJURIES			551
Clinic of Dr Robert H Herbet	Presbyterian Hospital		
ACQUIRED STRUCTURE OF THE LOWER END OF THE URETER THREE CASES			565
HEMNIA OF THE URINARY BLADDER			573
A CASE OF CROSSED DYSOPIA OF THE RIGHT KIDNEY			579
Clinic of Dr Kellogg Speed	Presbyterian Hospital		
A NEW TYPE OF FRACTURE OF THE CALCANEUS WITH DISCUSSION OF THE COMMON IN JURIES OF THIS BONE			583
Clinic of Dr Frederick Christopher	Evanston Hospital		
A CASE OF FECAL FISTULA ORIGINATING IN THE SIGMOID RESECTION OF FISTULA AND ADJACENT SIGMOID LATTEAL ANASTOMOSIS RECOVERY II A CASE OF FECAL FIS TULA ORIGINATING FROM A GUNSHOT WOUND OF THE RECTUM FISTULA COMMUNICAT ING WITH THE BUTTOCK CARREL DARIN TREATMENT RECOVERY			593
Clinic of Dr Sumner L Koch	Wesley Memorial and Cook County Hospitals		
THE TREATMENT OF CONTRACTURES WITH THE AIM OF FREE FULL THICKNESS SKIN-GRAFTS AND PUNCTURED FLAPS			611
" " " " " "	" " " " " "		62
" " " " " "	" " " " " "		63*
Clinic of Dr Edwin M Miller	Presbyterian Hospital		
CHRONIC DUODENAL ULCES			643
Clinic of Drs Arthur H Parmelee and Edwin M Miller	Presbyterian Hosp ital		
CONGENITAL BOWEL OBSTRUCTION			649
Clinic of Dr Jerome R Head	From the Service of Dr C A Hedblom Research and Educational Hospital University of Illinois		
THE TREATMENT OF CHRONIC EMPHYEMA			65
Clinic of Dr H Hoyt Cox	Wesley Memorial Hospital		
ACUTE BACKACHE DIAGNOSIS AND TREATMENT			663
Clinic of Dr J P Greenhill	Chicago-Lying In Hospital		
OPERATIONS DURING PREGNANCY			669
Clinic of Drs Edmund Andrews and R H Jaffe	Research and Educational Hos		
" " " " " "	" " " " " "		681
" " " " " "	" " " " " "		699
" " " " " "	" " " " " "		701
Clinic of Dr Daniel V Firendrath	Michael Reese Hospital		
POSTOPERATIVE COMPLICATIONS IN CHOLECYSTECTOMY			711
Clinic of Dr Levin S Kohl	Michael Reese Hospital		
RENAL AND URETERAL CALCULI			*31
Clinic of Dr Vincent J O'Connor	Harrison Boulevard Hospital		
TRAUMATIC DISLOCATION OF THE KNEE			*43
Clinic of Dr Hugh N Mackechnie	South S H p al		
SPLEN MEGALY			* 1
Clinic of Dr Irving F Strain	Michael Res		
TORSION OF THE UTERINE ADNEXA			763
SARCOMA OF THE UTERUS			771
Isthmoplasty of the Fallopian Tube			777
Clinic of Dr George De Yarrowsk	" " " " " "	University of Illinois	
" " " " " "	" " " " " "	" " " " " "	
PRIMARY LYMPHOCYTIC CAVERNA			783
Clinic of Dr J R Buchbinder	" " " " " "	" " " " " "	
LEUCOSTHOMASIS OF THE			799

THE SURGICAL CLINICS OF NORTH AMERICA

Volume 7

No. 3

CLINIC OF DR. ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

MELANOTIC TUMOR OF THE BRAIN

THE case which I shall present to you this morning is one in which my colleague, Dr. Thor Rothstein, has made a diagnosis of brain tumor. The patient is a woman about thirty years of age, who has had symptoms of intracranial pressure for several months and who has recently developed some localizing symptoms. The chief symptoms are those of choked disk, with marked loss of vision, vomiting, and headache. The localizing symptoms have been those of a lesion in the region of the arm center on the right side of the brain causing inability to determine shape of objects placed in the left hand, inaptitude to handle objects with this hand, and slight decrease of sensation on the left hand and arm. She complains also of weakness of the left hand, but the actual strength of this hand is nearly equal to that of the right hand. The left half of the face presents a very slight muscular weakness. In obtaining the history of the case and making the physical examination one interesting fact stands out which may have some bearing on the pathologic condition for which we are operating. She has a very extensive dark brown pigmented birthmark on the back covering altogether, I should think, more than a square foot in area.

The patient has had the entire head shaved and thoroughly sterilized, and we shall operate under the sequence of ethylene and ether. Dr. Rothstein desires me to expose the motor area, as he located the tumor mainly behind the motor area in the

arm center of the right side of the brain I make a large omega shaped flap through the scalp and control the hemorrhage from the scalp which is very free by a large number of artery forceps applied directly to the bleeding points taking care in doing this not to strip up the periosteum from the underlying bone In locating the fissure of Rolando I have used the simple rule of taking a large silk ligature about 2 feet in length and putting an artery forceps on one end of it having the assistant hold it over the glabella the smooth surface between the two eyebrows and carry the other part of the thread over the midline of the skull back to the external occipital protuberance which as you know is called theinion and place another artery forceps over the long thread at this point Then I take half the distance from the glabella to theinion and measure the point on the scalp about $\frac{1}{2}$ inch posterior to this and drop down from the midline of the skull a line $67\frac{1}{2}$ degrees This central line is parallel to the superior longitudinal sinus and this line at $67\frac{1}{2}$ degrees marks fairly accurately the fissure of Rolando The upper third of this area in front of the fissure of Rolando is the motor area of the leg center A little lower down is the motor area of the trunk In the neighborhood of the middle third is the motor area of the upper extremities and the lower third is the motor area of the face These simple measurements are quite sufficient in a case where we raise up a large osteoplastic flap to locate a tumor in the area about the motor area

I now make four trephine openings in the line of my omega shaped flap in the bone and divide with a Gigli saw the bone between each two openings taking care to saw the bone so as to make a bevel in the external table forming a larger area than the internal table so that in replacing the osteoplastic flap there will be no danger of pressing the flap down on the brain This is obviated by this beveling You will see that this part of the procedure the trephining and the use of the Gigli saw is rather time consuming It has however the advantage of being quite safe and is much simpler than the use of an electric trephine or drill I have divided the bone completely and elevated the osteoplastic flap with two large periostomes and fractured the bone

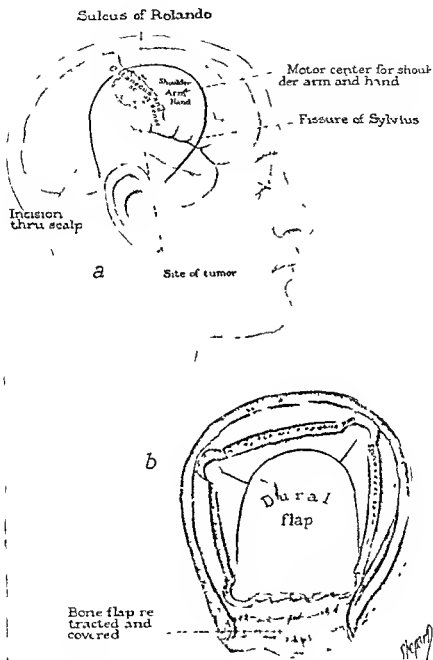


Fig 268 —a, b, Incisions for approach to tumor

help but think that there is a definite relationship between this tumor and the dark brown pigmented birthmark on her back and that this tumor is a Cohnheim tumor in the sense that it springs from an embryonic rest of pigmented cells which were deposited in the brain in the development of the child just as the pigmented cells were deposited in the skin of the back. As I carefully examine this tumor I find that there are five or six good sized blood vessels in the wall leading to the tumor. There is a very definite line of demarcation between the tumor and the normal brain tissue. I ligate with a very fine needle and very fine catgut the blood vessels in the pia which run to the tumor and now with a smooth spatula I begin to separate the tumor from the brain tissue. You see that this is done without very much difficulty. There appears to be a very definite line of cleavage between the tumor tissue and the brain itself. As I continue the separation the tumor as you see begins to roll out from the brain. There is little or no hemorrhage. I finally now roll it into the palm of my hand and find it is about the size of an ordinary hen's egg. Possibly some of you have seen a hen's egg which has been laid without an eggshell surrounded by a rather soft capsule which holds the contents of the egg fairly well in position but of course without the rigidity of the egg shell. You will notice as I hold this tumor in my hand that it has much the same sort of consistency and that it is easy to modify its shape, although it has no distinct or definite capsule it gives one the impression almost as if it were contained in a membrane. I now very carefully suture the dura back in position and then we replace the osteoplastic flap and sew it in position with half a dozen silkworm gut sutures and with silk to the skin. It is necessary as you see to put in a number of skin sutures in order to control the bleeding from the edges of the incision. The wound is closed without any drainage and is resterilized with alcohol. A large gauze dressing is applied and held in position by a soft gauze roller and by starched bandages so as to give quite complete immobilization of the flap and the dressing is also applied tight enough to exert a moderate amount of pressure.

Comment—These melanotic tumors of the brain are rather rare although a number of similar cases are reported and they are exceedingly interesting. They may be either benign or malignant. I am rather inclined to believe that the tumor which we have found this morning is benign because it is so distinctly circumscribed and that we shall have no recurrence of the growth or of the symptoms. Using this case as a text I want to give you my impression of the present status of surgery of brain tumors.

Since the time of the first brain tumor operation by Godlee in England which was in 1884 the field of brain surgery has been invaded by a large number of surgeons with a great deal of enthusiasm. The early work was very largely English and was done jointly by a group of English neurologists and physiologists and English surgeons notably Ferrier Gowers Horsley Beever and Sherrington. A good deal of excellent work has been done by Continental surgeons especially by Eiselsberg in Vienna and Krause in Berlin. Possibly the best work has been done here in America by a group of neurologic surgeons headed by Harvey Cushing and by Charles Frazier. Brain surgery in Great Britain and on the Continent is done as a rule as a piece of team work between the neurologist and the general surgeon. Here in America we have been developing some neurologic surgeons who embody in their own person the combination of neurologist and surgeon. This is well illustrated by Cushing and his associates and Frazier and the group under him. I think there is a place for both schools and for team work between the neurologist and the well trained general surgeon and there is certainly a place for the specialist in neurologic surgery. I hasten to add however for the exceptional man. I am not at all converted to the position that we should develop a large group of specialists in neurologic surgery because if we do we shall develop a large number of men who are not nearly as competent as some general surgeons who are especially interested in this work. But that is true in any specialty. It is probable that for the most part the solution arrived at in Great Britain and Central Europe namely the team work between neurologists and sur-

geons is one that will be generally adopted but that a number of outstanding neurologic surgeons will be developed also who will do a large amount of this work and will add materially to our present knowledge

I read the other day a very interesting review of neurologic surgery made by von Eiselsberg at the last German Congress of Surgeons held in Berlin in October 1926 Von Eiselsberg represents as well as anyone I know of the competent general surgeon who has devoted a large amount of time and study to this subject and made himself particularly competent in its field He reported in this paper all of the brain and cord work which he had done covering a period of about thirty five years and I think this review gives better than any article I know of a fair analysis of this whole subject and its possibilities and its very definite limitations Von Eiselsberg in the concluding remarks of his paper is rather optimistic that in another fifty years the reporter presenting this subject of brain surgery to the German Congress of Surgeons will be able to report great progress I am myself converted to this view in a general way and yet I desire to state that there are certain very definite limitations to the possibilities of this field There are certain immutable laws which control this situation which will make for all time brain surgery an extremely difficult dangerous and unsatisfactory field To begin with if we take a large group say one hundred brain tumors we are met at the outset with the fact that only a small percentage possibly not more than 5 per cent certainly not more than 10 per cent are so situated and of such character that they can be diagnosed before operation removed and have the patient recover This is true because so many of them are malignant and so many of them are not localized tumors but infiltration tumors which are situated in a portion of the brain from which they cannot be safely removed Then again in doing brain surgery we are confronted at the outset with the fact that we are dealing with a cavity with unyielding walls, that we are dealing with structures which are in certain locations extremely delicate and are very essential to life and cannot be disturbed without fatal results I think it is wise for us to accept these

facts in analyzing this whole problem. This tumor which I have presented to you today represents an extremely satisfactory case of brain tumor. I have now on the service 3 other cases of brain tumor which are not nearly as satisfactory and which I shall present to you.

After-history—The patient fortunately went on to a very satisfactory recovery. The headaches disappeared at once. These had been very intense. The eyes have improved. About the third day she had a rather violent mental disturbance and wanted to get out of bed and had to be restrained. She was quieted with some bromids and the next day this evidence of brain irritation had disappeared quite completely, and she has gone on to a very complete operative recovery and is progressing rapidly to what is apparently a complete recovery from the symptoms caused by the brain tumor. Her eyesight is returning rapidly to normal, there has been no recurrence of the headaches, and the vomiting has entirely disappeared.

Pathologic Report (Dr. Rothstein)—The histology of the tumor is analogous with the histology of cutaneous nevi.

The second patient I show you now is a man of thirty five, a patient of Dr. Kelly's, who has very largely the same symptoms as the woman upon whom we have just operated, except that the location is on the other side of the brain. My colleague, Dr. Thor Rothstein, made a diagnosis in this case of tumor of the left temporal lobe involving or pressing upon the first temporal convolution. I operated upon this patient about twenty days ago, raised up an osteoplastic flap as in the first case, with the exception that the operation was planned to expose the brain farther down than in the first case, exposing the sylvian fissure and the temporal lobe. Here was found an infiltrating glioma visible on the surface of the second temporal convolution. The tumor was about the size of an egg and faded into the surrounding brain tissue. It was of dark reddish purple color and on the surface was about the size of a large prune. There was no line of cleavage. I removed the greater portion of the tumor with a smooth spatula controlling the hemorrhage with cotton wrung out of normal salt solution. I found, however, that because of

the infiltrating character of the tumor it could not be entirely removed. In removing it I broke into the inferior horn of the lateral ventricle. The man fortunately has made a very great improvement. His headaches have disappeared, eyesight is improving, and his speech and understanding of the spoken word are very much better than before. Some days after the first operation I did a subtemporal decompression on the right side at the suggestion of Dr. Rothstein and removed after dividing

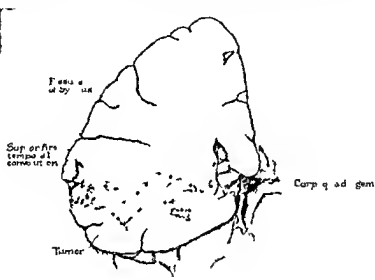


Fig. 21.—Frontal section of brain. Tumor has destroyed second temporal convolution and some part of superior temporal convolution.

parallel with the fibers of the temporal muscle, most of the bone at the floor of the temporal fossa and also split by a crucial incision the dura so as to obtain a full decompression effect. Dr. Rothstein contemplates using radiation in this case over the area of the tumor with the hope that it may inhibit the growth or even as a vague possibility produce a cure. But in this case you see we are confronted by the fact that from the very infiltrating character of the glioma it is probably one which will continue to grow and terminate fatally. Although the temporary

improvement in this case is really brilliant it is probably not lasting

The third case which I shall present to you now is this girl of twenty-eight, a patient of Dr Gill's, who developed very marked general pressure symptoms of brain tumor with choked disk, headaches, convulsions and vomiting, and in whom Dr. Gill desired me to make a subtemporal decompression on the right side with the hope of relieving her. This poor woman has had a

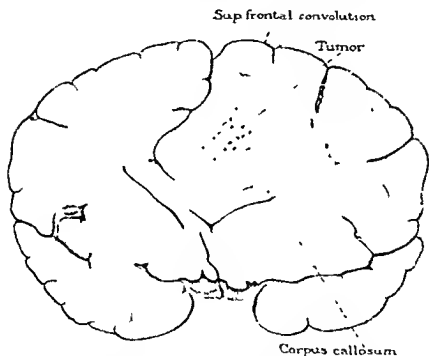


Fig 272 —Frontal section of brain anterior to chiasma

good deal of relief from the headaches. Her eyesight is slightly improved by the decompression operation. We did not, however, at the time of the operation locate the tumor in the field which we exposed, and she is, although somewhat benefited, almost certain to die from the increasing pressure of the cranial tumor.

Two weeks ago I operated for Dr Rothstein on another case which will illustrate another phase of this subject. This was a patient of Dr Dick's, one of our attending physicians

in the hospital who had called in Dr Rothstein as the consulting neurologist. Dr Rothstein made the diagnosis of either brain tumor or chronic abscess. The patient had marked pressure symptoms and Rothstein felt that the tumor probably was located in the right frontal lobe anterior to the motor zone. I exposed the frontal lobe anterior to the motor area by a large osteoplastic flap and exposed the cortex by division of the dura but was not able to locate the tumor either by palpation or by introduction of a smooth large probe which often enables me to determine the different densities between the tumor itself and the brain tissue. Nor was I able to locate an abscess or cyst with an aspirating needle. The operation therefore was exploratory. The osteoplastic flap was returned and the patient went on to a fatal termination within a week or ten days with increasing intracranial pressure symptoms. We fortunately obtained a postmortem. In the postmortem examination was found this large infiltrating glioma which presents itself not on the external surface of the brain but involves the white substance of the superior frontal convolution, the gyrus linguæ and corpus callosum causing a bulging of the mesial surface of the right frontal lobe. The consistency of the tumor is about the same as that of brain tissue. There was no dilatation of the ventricle and the location of the tumor and the infiltrating character of the tumor made it one which was inoperable from the standpoint of successful removal even though we had known its exact location. I failed to state that at the time of the operation we converted the exploratory into a decompression operation by removing a large amount of bone in the temporal fossa but replacing the rest of the osteoplastic flap.

These 4 cases which I have had the opportunity of presenting to you may give you a fair idea of this work. Fortunately in tumors of the cord we have a field which is much more gratifying. We have recently had four cord tumors which Dr Rothstein and myself have been able to locate and remove successfully not only from the standpoint of the immediate recovery of the patient but apparently from the standpoint of permanent recovery.

TWO CASES OF HEAD INJURY

I HAVE this morning 2 very interesting cases of head injuries which I shall operate upon and discuss with you. The first is a man who was brought in here last night about midnight, a man of forty who was found in an alley not very far from his bakery, unconscious and very badly beaten up. His family did not know who his assailants were or anything beyond the mere fact that he was found unconscious, with blood running over his face, his ears, and scalp. A local physician was called who cleaned up some superficial wounds on the scalp, called an ambulance, and brought him to the hospital. Last night my associate, Dr. Straus, had the entire head shaved carefully and the rather superficial scalp wounds thoroughly sterilized. It was not necessary to débride any of them.

As you look at him you see that the left eye is completely closed and the eyelid very black. There is a depression in the scalp on the forehead on the left side which is quite visible, as you see, and as you put your finger in this depression it gives you the impression of a fracture of the skull with a very definite depression. The x-ray picture shows an extensive fracture reaching out from this depression in the scalp. There is no paralysis of the extremities or of the face. The pulse is 60. There has been involuntary urination and defecation. The patient does not respond when spoken to. He thrashes about rather violently in bed and has had to be restrained. We can make out no evidence of injury of the cranial nerves. I should say that we have present all three of the clinical conditions that we find in connection with severe head injuries. That is, he probably had an immediate concussion producing unconsciousness and he now has contusion, and probably laceration of the brain, with also a compression due to hemorrhage or possibly to both hemorrhage and a depressed fracture, with the possibility of the additional factor of compression from edema. It is clearly a case that should be explored.

internal carotid In about two-thirds of the cases a collateral circulation at the circle of Willis would be sufficient to carry on the blood-supply, and no necrosis or softening would result. In this particular group of cases, where an aneurysm of the internal carotid has developed after an injury, the prognosis is somewhat better because frequently a collateral circulation has been established. Ligations of the common carotid in this group probably carries with it only about 10 per cent mortality. One's first impression, in a case of this kind, would be that the most



Fig 274 —Ligation of common carotid

direct method of attack would be the ligation of the internal carotid. That is true. It is much more efficient than ligation of the common carotid, but unfortunately, it is too efficient and, in fact, it carries much more risk of necrosis than ligation of the common carotid. Why is this true? Because when we ligate the common carotid the current from both the internal carotid and the external carotid are cut off, but there is an immediate tendency to a re-establishment of the carotid circulation between the many branches of the external carotid of that side

and the external carotid of the other side, making for a much earlier establishment of collateral circulation and carrying much less danger of cerebral necrosis. I have tested this out in a number of cases. I have twice had the experience of ligating the common carotid, and having the aneurysm disappear and then return. In one of these cases I ligated at a second operation the internal carotid, and succeeded in obtaining a permanent cure. In the other case of this kind I ligated the internal carotid, and though I cured the aneurysm the ligation produced cerebral necrosis with aphasia and paralysis of the opposite side.

We shall proceed to the ligation of the common carotid in this case, and we shall do the operation under local anesthesia. Ligation of the common carotid may appear to you to be a formidable operation. As a matter of fact it is an exceedingly easy operation to perform, provided you understand thoroughly the anatomy involved and the technic. I shall inject novocain solution with a little adrenalin added in the border of the sternocleidomastoid, beginning about the middle of the thyroid cartilage and extending downward almost to the sternum, infiltrating the skin and the superficial fascia and the sternocleidomastoid thoroughly with local anesthesia. I divide the skin and superficial fascia and the platysma. I retract these structures, and expose the inner border of the sternocleidomastoid. I draw this to the outer side and expose a good-sized artery, a branch of the superior thyroid, running across the upper part of the line of my incision. This is called the sternocleidomastoid branch. I doubly clamp this, divide and ligate. I draw a lobe of the thyroid gland to the inner side and expose the sheath of the great vessel. Running in front of the sheath is the descending hypoglossal nerve, a fine white thread. The internal jugular overlaps the artery. Very gently I draw the internal jugular to the outer side, and have the assistant hold it in that position with a blunt retractor. I now expose the common carotid and, with a smooth pair of artery forceps, I separate the common carotid from the internal jugular and from the pneumogastric nerve, which lies behind both of these structures and between them. I free the entire circumference of the artery. You see it is a great pinkish-

white tube the size of my little finger and you can distinctly see the pulsations of the artery. I now pass the aneurysmal needle under the artery and thread it with moderate sized iodine catgut and withdraw the needle. I now have the artery in the loop of this gut. I tie it tightly and you will see immediately the pulsation ceases. Applying a stethoscope the pulsation of the projecting brain hernia covered by scalp tissue ceases, and when I apply a stethoscope the aneurysmal roar has ceased. From the statistics which have been accumulated on this subject, the danger of cerebral necrosis is not much over 10 per cent. Considering the gravity of the condition this is a risk which can be very properly accepted in an attempt to cure this aneurysm.

After-history—Unfortunately following operation, a paresis, and finally quite a definite paralysis of the right arm and leg has developed as well as aphasia. There has been a steady gradual but slow improvement in this condition. My colleague Dr Gill, who has had charge of the neurologic side of the case, and who kindly referred the patient to my clinic for operation, is hopeful that there may be improvement, and possibly a complete disappearance of the paresis and aphasia. Personally I am inclined to think that the condition is more or less permanent, although it is too early now, at the end of three weeks after operation to be able to form a definite conclusion as to the outcome.

CLINIC OF DR. GOLDER L. McWHORTER

PRESBYTERIAN HOSPITAL

OPERATION ON TWO CASES OF SECONDARY CARCINOMA AND ON ONE CASE OF PRIMARY CYSTADENOMA OF THE PAROTID GLAND. RELATION OF THE LOBES OF THE PAROTID TO THE FACIAL NERVE

WHILE the frequency of parotid tumors is not great they deserve especial consideration because of their frequent malignancy, and because of the deformity due to paralysis of the facial nerve either from the tumor itself or by operative injury.

I wish to present 3 cases operated on for a tumor of the parotid gland. The first 2 were secondary carcinoma, one being a metastasis from a primary tumor of the eye, the other a direct extension from an epithelioma of the face, the third case was a primary benign papillary cystadenoma in the parotid. The first case was treated by a radical dissection of the entire parotid with preservation of the facial nerve branches, the second, with surgical diathermy, and the third, by local excision of the tumor from the gland.

Case I—E. C. Italian male, age sixty five years

Diagnosis—Carcinoma metastasis from the eyeball, involving entire parotid gland

History—Six years ago a small ulcer on the right eyeball gradually increased in size until the eye became a huge ulcerated mass from which he could not see. Two years ago the eye was removed elsewhere for this ulcerated condition. At the time that the ulcer appeared the patient noticed a small swelling on the cheek and at the time the eye was removed the mass on the cheek was about the size of the end of his little finger. However, the doctor who operated and removed the eye did not want

to remove the mass on the cheek at the time. There never was a similar condition in his family and so far as he knows there has been no cancer. He has three sisters, no brothers.

Examination—Well developed male. The right eyeball is missing and the upper and lower right eyelids are partially gone; they are fused and retracted in the orbit. Just at the upper and outer rim of the orbit is a small nodule the size of a pea. This mass is hard and lightly attached to the underlying tissues. Over the right side of the cheek protruding in front of the ear and slightly downward and forward there is a moderately large swelling. This swelling is quite hard and smooth and seems to be fixed at the upper part to the deeper tissues near the zygoma and along the masseter muscle; the mass apparently involves the parotid gland. There is no apparent paralysis of the facial nerve though motion in the orbital muscle was largely destroyed by the previous operation. There was no paralysis evident in other cranial nerves in the vicinity of the gland or vasomotor disturbances on this side of the face. There was a slight cough but roentgenograms of the chest showed no definite evidence of metastasis and the cough gradually improved.

At first examination it was thought that due to the fixation of the mass over the parotid region there must be extension to the deeper tissues and that it would be impossible to remove it fully. After observation, however, I decided that an effort might be made to remove it since it was almost certainly a metastasis from an epithelioma arising from the eye; the nodule in the orbit being undoubtedly a similar metastasis.

With such a slow growing carcinoma there seemed a possibility of cure or at least of temporary relief.

Operation—Local anesthesia 1 per cent procain with adrenalin morphin sulphate grain $\frac{1}{2}$.

The first step in operating this case for radical removal of the parotid gland with the regional lymph glands was to make an incision along the anterior border of the sternocleidomastoid muscle over its upper two thirds. Numerous glands of good size were present under the muscle and along the internal jugular vein. A skin incision was made transversely just below the origin

of the sternocleidomastoid muscle extending through it and exposing numerous glands beneath. These glands were dissected

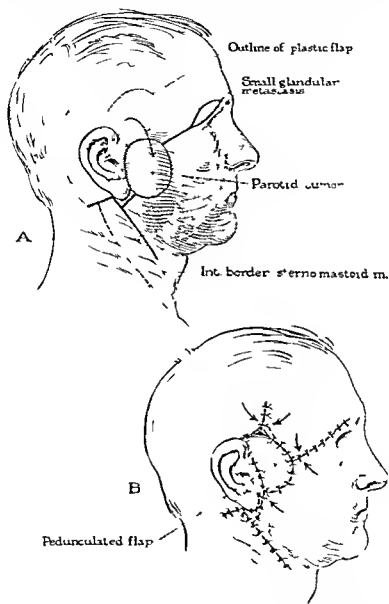


Fig. 275—A Operative technic used in Case I for removal of entire parotid gland with preservation of the facial nerve. B Plastic closure with a pedunculated skin flap.

from the jugular vein and carotid vessels. The spinal accessory nerve was saved from injury.

The submaxillary glands were not enlarged and were not dissected out. The external carotid artery was ligated above the lingual branch. The first incision was then extended upward, separating to pass around the parotid mass and then curving forward to excise the nodule over the orbit (Fig 275 A). The parotid mass was dissected out starting at the anterior margin of the superficial lobe which is much larger and extends well forward from the deeper lobe. This mass was lifted upward and peeled away from the under tissues identifying at the same time the branches of the facial nerve which were not involved. The entire gland seemed to be a hard indurated mass.

The superficial lobe was dissected back to its central junction with the deep lobe and the lower part of the deep lobe and duct removed with it. The remainder of the deep lobe extending higher up beneath the upper branches of the facial nerve was then removed, care being taken to avoid injury to them. The most difficult part of the dissection was about this isthmus or central junction of the superficial and deep lobe where the gland ducts and branches of the temporal artery were intermingled with the temporofacial and cervicofacial branches of the nerve. The nodule over the orbit was excised.

This dissection left a large area which the skin would not cover in front of the ear, exposing the branches of the facial nerve. I then cut a pedunculated flap with the base just above the ear to cover this raw area (Fig 275, A). This skin flap was turned on its pedicle and fitted into the defect where it was sutured. The raw area left above the ear was closed to a large extent by undercutting from the sides and drawing them together with silkworm gut (Fig 275 B). The incision in the neck was closed below with silkworm gut and linen, leaving in a small soft rubber drain.

Pathology—Grossly the parotid gland was invaded and almost entirely replaced by a hard somewhat friable tumor tissue. There seemed to be no definite extension beyond the capsule.

Microscopic Examination—The section from the parotid gland tumor showed almost solid areas of large epithelial cells with a few connective tissue strands and narrow areas of necrotic

tissue among them. There was no normal parotid tissue, but the ducts could be identified. There was some infiltration with round cells. The cells were large, closely packed, and they contained many typical mitotic figures.

The microscopic examination of the nodule removed above the orbit showed an encapsulated round mass resembling a lymph-gland, but the cells were almost entirely replaced by large carcinoma cells similar to those seen in the parotid. There was a capsule about it.

Diagnosis.—Carcinoma metastasis.



Fig. 276—Photograph of Case 1 four weeks after radical removal of the parotid gland due to carcinoma metastasis

Postoperative Course.—There was a primary union except for a small granular area above the ear, which healed in about three weeks (Fig. 276). At this observation, six weeks later, the patient is in good condition and there is no evidence of local recurrence. There is still paralysis of the depressor labialis inferioris, as shown by inability to lower the lip on that side. This branch may recover its motion after a few weeks or months. The other branches show good motion.

Case II—S W male aged seventy seven years

Diagnosis—Secondary epithelioma of parotid with facial paralysis local extension from the skin

History—Onset of epithelioma came from a small pimple following a barber cut on the cheek nineteen years ago. This lesion remained about the same size for seven years when another barber treated a scab on the pimple with some medicine which started it growing. One and a half years ago the growth was about the size of a quarter but it has grown rapidly ever since. One year ago a paralysis of the facial nerve developed.

Four years ago the patient went to a physician who treated him with radium every two weeks over a period of two years. At this time the ulcer almost healed but a short time afterward the ulcer began to grow rapidly.

Examination—Elderly moderately nourished male. There was a large ulcerated area involving almost the entire left cheek. It extended from the zygoma above downward in front of the ear over an area the size of the palm of the hand. The ulcer was very deep and apparently involved the masseter muscle and the parotid gland. Apparently all of the muscles of the eye, cheek and lip on this side of the face including the depressor labialis inferioris were paralyzed. There was no evidence of involvement of the glands along the neck.

I diagnosed this extensive ulcerated destructive lesion as a basal cell epithelioma. Operation looked almost hopeless. However the disagreeable odor and deformity were so great that it was deemed advisable to attempt to destroy the growth if possible.

I chose surgical diathermy for several reasons. The chief one was that it seemed impossible to dissect away all of the diseased area with a knife while surgical diathermy would permit a destruction of adjacent tumor tissue at its base and along the mandible and zygoma. Another factor but of less importance was that the facial nerve was already completely paralyzed and its preservation was not possible.

Operation—Local anesthesia $\frac{1}{2}$ per cent procain with adrenalin morphin sulphate and scopolamin.

The surgical diathermy was used without previous ligation of the external carotid artery. The ulcerated area was extensively destroyed extending over the region of the parotid gland, the zygoma and the mandible which were also subjected to extensive diathermy. There was no hemorrhage during the operation and no attempt was made to close the large area.

Pathology—Microscopic examination of a section from edge of ulcer. There were deep infiltrating strands of cells from an ulcer of the skin resembling those of a basal cell epithelioma. There was considerable infiltration with lymph cells and polymorphonuclear leukocytes.

Diagnosis—Basal cell epithelioma of the skin with deep ulceration.

Postoperative Course—On the second and ninth days the patient had rather sharp hemorrhages from the region of the temporal artery. They were controlled by pressure. Five weeks later there was a clean granulating wound. There was a good sized piece of dead bone seen on the zygoma and also on the ascending ramus of the mandible. Two months later I removed these sequestra which involved only the outer layers of the bones. There was no salivary fistula evident at any time. Five months after the operation the wound had completely healed with surprisingly little deformity other than the previous facial paralysis. At the present time one year after operation the patient is in good condition with no evidence of recurrence.

Case III—Male 65 years old entered the Presbyterian Hospital October 13 1925.

Diagnosis—Benign papillary cystadenoma of the parotid gland.

The patient first noticed a small hard shot like well defined mass at the side of the cheek three years ago. There was no discomfort until about six weeks ago when there was a stinging pricking pain which lasted only a few minutes. Since then there has been a sensation of warmth and tightness in the region of the tumor. The tumor has increased gradually in size since first noticed. There has been no difficulty in eating.

Previous Illness—Typhoid at age of ten years Two or three attacks of influenza All of the teeth except 5 lowers removed six years ago

Family—Father died at eighty two of cerebral hemorrhage Mother died at seventy eight cause unknown Two brothers died one from cancer of the bladder Five brothers living 2 sisters living

Average weight 162 pounds

Examination—There was a mass in the region of the right parotid just anterior to the ear measuring about 2.5 x 1 cm It was unattached to the skin except at the lower pole The skin over it was slightly hyperemic There was no facial paralysis The tonsils were negative and mouth clean with bridgework and 5 teeth below and plate above I made a diagnosis of a probable benign adenoma or mixed tumor

Operation—Local anesthesia Vertical incision in front of the ear The tumor was quite deep It was about the size of a hazelnut and cystic The wall and tumor were carefully dissected out An upper branch of the facial nerve was intimately adherent to the wall of the cyst but was carefully freed The wound was closed without drainage

Pathology—The excised mass measured 2 x 1.5 x 1 cm It was rather light colored and firm in consistency There was one large cavity containing a comparatively large soft papillomatous mass attached by a narrow pedicle There were a number of small cavities lined by smooth shiny membrane

Microscopic Examination—There was considerable alveolar glandular tissue with occasional bands of connective tissue and a few areas of round cells

Diagnosis—Benign papillary cystadenoma of the parotid gland

Postoperative Course—There was a slight difficulty in closing the right eye tightly for a few days At this time sixteen months after operation there is no paralysis evident The scar can scarcely be seen and there is no evidence of a recurrence

DISCUSSION

A lack of appreciation of the anatomic relation of the gland to the facial nerve and the danger of permanent paralysis may lead one to undertake the removal of even small tumors of the parotid without a necessary warning of this possibility to the patient.

I wish to review an article I¹ published in 1917 on the surgical anatomy of the parotid gland, with especial reference to its excision and to the preservation of the facial nerve.

The parotid gland is described by the current English, French, and German text-books of anatomy as essentially a single mass, with various projections, occupying the retromandibular fossa and perforated by the facial nerve and its branches.

According to Grégoire,² Luschka first described the division of the parotid into two portions. This relation has been confirmed by Henle³ and by Grégoire upon careful dissections in the human (adult and fetal) and some of the mammalian species, the monkey, and the rabbit. In the guinea-pig and (usually) in the dog Grégoire found the facial nerve lying entirely beneath the parotid gland. In all of these cases he described the parotid as being divided into a superficial and a deep lobe with the facial nerve and its branches lying between them, except in the dog and guinea-pig. He asserted that the two parotid lobes are united at their upper extremities and that this relation results from the mode of development of the gland. In a human fetus of three months (8 cm.) he observed the parotid gland to be entirely superficial to the facial nerve, but he found the beginning of the deep lobe in a fetus of six or seven months, and concluded that further growth of the gland upward is prevented on reaching the base of the skull, and that the growing extremity is apparently deflected inward and downward internal to the facial nerve to form the deep lobe.

Corresponding to this mode of origin Grégoire described the duct from the deep lobe as passing upward and outward, above the branches of the facial nerve, to unite with the duct from the superficial lobe.

I made careful dissections of 66 adult human parotids (from

39 male cadavers) and of 13 parotids in the human fetus and newborn (total length 36 to 54 cm) The more important results which I found will be stated briefly

The human parotid gland (late fetal and adult) consists of large superficial lobe and a smaller deep lobe (Fig 277) which are usually readily separable with the exception of a small isthmus where they are more intimately connected

The connecting isthmus is somewhat variable in size and position and rarely absent It is not at the upper extremity of the gland (where a union of the two lobes is described by Gregoire), but somewhat lower usually located near the middle or the junction of the middle and upper thirds of the gland and somewhat posteriorly The isthmus except in 8 of the 66 adult cases, consists of gland parenchyma, together with connective tissue, including vessels and ducts of variable size and number

The ducts of the parotid are exceedingly variable in their relations and do not conform to the type described by Gregoire The main parotid (Stenson's) duct may be more closely associated with the superficial lobe (31 of 64 adult cases observed) or with the deep lobe (16 of 64 cases) or may proceed between the lobes toward the region of the isthmus without intimate relation to either lobe The main duct branches at a variable distance from the anterior border of the gland, and frequently not until reaching the region of the isthmus Each lobe has usually a main terminal duct which sometimes receives branches from the other lobe Small branches from either (especially the superficial) lobe may also join the main parotid (Stenson's) duct (Fig 277 A)

The facial nerve trunk and its main branches lie between the superficial and the deep lobe of the parotid gland (Fig 277) These lobes are not united at their upper extremities (A shaped), however with all the nerve branches below the junction of the lobes as described by Gregoire The two lobes are united rather in H shape the connecting isthmus corresponding to the cross bar (Fig 277 B) Upon approaching the isthmus of the gland from behind the facial nerve divides into its upper (temporo-facial) division which passes forward above the isthmus and

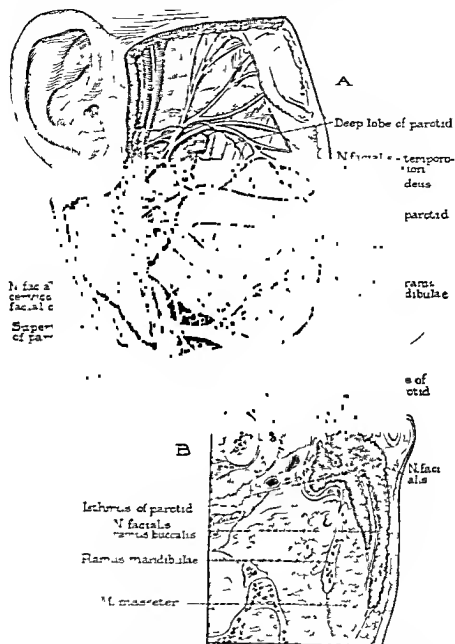


Fig. 257—A The relations of the superficial and the deep lobe of the parotid to the duct and to the facial nerve. The anterior portion of the superficial lobe which has been removed is indicated by the black line. A small accessory lobe is shown on the anterior part of the parotid duct. B, Horizontal section of the head in the region of the parotid to show the relation of the superficial and deep lobes of the parotid. The two lobes are shown separated by branches of the facial nerve except in the region of the isthmus. The extension forward of the superficial lobe beyond the deep lobe is well shown in this section.

its lower (cervico facial) division which passes below the isthmus (Fig 277 A) The uppermost and lowermost facial branches may not come into contact with the deep lobe (on account of its small size) though still under cover of the superficial lobe of the parotid The facial branches lie between the two lobes some times infolded in grooves on the opposing surfaces Rarely are they entirely surrounded by the gland parenchyma In the neighborhood of the ducts the nerve branches lie superficial to those ducts more closely associated with the deep lobe and beneath (internal to) those ducts more closely associated with the superficial lobe Thus the relations of nerves and ducts are quite variable but in no case were all of the ducts from the deep lobe observed to pass upward and outward above all the facial nerve branches as described by Gregoire The relations found are therefore not in agreement with Gregoire's theory of the development of the parotid lobes

In general since the relations found in the dissections of the late fetus and newborn were essentially similar to those above mentioned for the adult no separate description of the former is necessary In one full term fetus of 50 cm the two lobes were nearly equal in size but the deep lobe was usually found to be much the smaller It should be noted however that no observations were made upon younger fetuses to determine the developmental relations

The results of my investigation may be summarized briefly as follows The human parotid gland (late fetal newborn and adult) consists of a larger superficial and a smaller deep lobe usually distinct and readily separable with separate ducts The facial nerve and branches lie between these lobes The lobes are usually joined (not at their upper ends but lower down) by an isthmus separating the temporofacial and the cervicofacial divisions of the facial nerve

One more important fact which is not mentioned in most books on anatomy is that the nerve supply to the depressor muscles of the lip passes along the ramus marginalis mandibulae of the facial nerve This branch passes below the angle of the mandible where it pierces the deep cervical fascia and extends down

ward and forward beneath the platysma muscle. It gives off the anastomatic slip for the depressor muscles of the lip at the level of the hyoid bone which in passing upward to join the supra-mandibular branch crosses the mandible near the facial artery. Because of this relation as Burrows⁴ has pointed out paralysis of the lower lip has not infrequently resulted as a sequel to the removal of tuberculous glands from the neck.

Clinically surgeons have found that complete removal of the parotid gland is quite difficult. In 1885 Stimson⁵ reported the successful removal of the entire gland but states that of course there was complete paralysis of the facial nerve. Previously many writers had reported its excision too hazardous to be undertaken.

In the literature I have been able to find records of only 3 cases of complete removal of the parotid gland followed by no permanent paralysis of any branches of the facial nerve. Von Haberer⁶ reported a hemangioma of the parotid removed locally with a recurrence three weeks later. He performed a radical removal of the parotid gland followed by some paralysis of the facial nerve for several weeks but all branches had recovered after five months. Barbat⁷ removed the entire gland for a mixed tumor. There was complete paralysis for a short time. Two months later there was return of motion the last muscle restored being the orbicularis oris. Burckhardt⁸ removed the entire parotid gland for an angioma. There was some paralysis of the lower lip and the angle of the mouth for a few days but this cleared up in a short time. Twenty months later there was no apparent paralysis of the facial muscles.

Adson and Ott⁹ have described their technic for removing the entire gland in the presence of malignancy but in a case reported there was already some invasion of the nerve. They mention the technic of Sistrunk¹⁰ in first dissecting the gland from below exposing the inframandibular branch of the facial nerve as it runs over the facial vessels. They then start from the upper margin of the gland and dissect downward following the temporal and cervical portions of the facial nerve through the parotid and on the muscles of the face. Sistrunk found

that a temporary paralysis of the facial branches frequently followed excision of tumors from the gland but that it usually disappeared within a year

Pathology and End Prognosis of Parotid Tumors—Under the discussion of tumor of the gland one must exclude obstruction of the ducts with calculi and acute or chronic inflammation. Acute inflammation may occur in mumps or be due to invasion of pyogenic organisms complicating operations the infectious diseases or cachexia. Occasionally there is acute or chronic inflammation of the lymph glands in this region with apparent enlargement of the parotid. Frank¹¹ was the first American surgeon to report a case of primary tuberculosis of the parotid gland which is a rare condition only 8 cases having been reported at that time. The diffuse form was found more commonly than the circumscribed. He recommended local excision with curettage. Actinomycosis of the parotid may occur.

Classification of neoplasms of the parotid is somewhat difficult. Kaufmann¹² classifies them first from epithelial origin including as benign the adenoma including a soft simple glandular or cystic adenoma and a hard adenochondroma as malignant adenocarcinoma rarely scirrhus the squamous and a combination of chondromyxoma or sarcoma with carcinoma. Second from connective tissue origin he includes as benign fibroma (rare) chondroma lipoma hemangioma lymphangioma under the malignant he includes sarcoma pure or mixed spindle-cell and the rare round cell or pigment cell sarcoma the mixed tumors and finally the lymphoma (Mikulicz).

Benign tumors of the parotid are relatively rare. Nylander¹³ reported a parotid cyst in a man fifty years old the cyst being of two years growth. It contained milk like fluid and he classed it as congenital. A rhabdomyoma containing bone sequestra in a boy of seven years was removed by Prudden¹⁴. Rennie¹ reported a huge fibrocystic movable tumor weighing 12 pounds of twenty eight years duration. Hutchinson¹⁵ describes a peculiarly laminated neuroma of two years duration closely connected with the facial nerve. Chappel¹ removed a cystic myxomatous tumor of eight years duration with no evidence of

malignancy Angiomas have been mentioned (Burckhardt and von Haberer) The one removed by von Haberer showed some evidence of local malignancy Bigelow¹⁸ in 1863 reported benign tumors of a cartilaginous character Papillary cyst adenomas such as my Case III, are well known They rarely undergo malignancy

Barron,¹⁹ Kennon²⁰ and Fraser²¹ believe that the mixed tumors arise from epithelium of ducts or acini, the epithelial strands themselves gradually become transformed into the mucoid and cartilaginous tissue, which is unique and not found elsewhere Other authors classify them as embryomas, as of embryonic origin from gland cell rests (McFarland), mesotheliomas, endotheliomas carcinomas and basal cell epitheliomas

The mixed tumors are relatively benign although many recur after years with increasing malignancy, but rarely produce metastasis Gatewood²² reviewed the cases of tumors of the parotid in the Presbyterian Hospital of Chicago during a period of five years He found 13 cases, and all were mixed tumors The age of the patients varied from sixteen to sixty four years

If the tumor arises from the deep lobe of the parotid gland, which is rare, injury to the facial nerve is more difficult to avoid, and recurrence from incomplete removal is more likely to result Kennon²⁰ found a recurrence after operation in 28 per cent or 8 out of 28 cases of mixed tumors over a period of five years He found that the epithelial cells persisted longest around the blood vessels and beneath the ever thinning capsule making it advisable to excise rather than enucleate it because of the danger of tearing the capsule Where there was a recurrence it usually developed within one year McFarland²³ found recurrence took place in 25 per cent of mixed tumors

Primary carcinomas may occur in the parotid Collet and Bonnet²⁴ report 2 cases, 1 being scirrhus in character These authors describe a syndrome quite characteristic of carcinoma of the parotid gland The syndrome includes an early paralysis of the facial followed by that of other nerves in the retroparotid space This includes a partial or complete paralysis of the

sympathetic, the glossopharyngeal, the vagus, with frequent voice changes the spinal accessory, and the hypoglossal. With the development of these symptoms the outlook becomes quite hopeless.

Operations for primary carcinoma of the parotid have given very mediocre results. Lecene²² has had 3 cases with recurrence within one and one half to two years. In Kennon's²⁰ 8 cases operated on for primary carcinoma of the parotid 7 died in one to five years while in 1 there was no recurrence after fifteen months. In 6 sarcomata only 1 case was traced. There was recurrence eighteen months after operation followed by death.

Other types of primary malignancy have been described. Deane¹⁸ in 1854 reported extirpation of a parotid tumor, which on section showed melanotic degeneration with inky fluid in the center. The late results were not reported. Partsch²⁷ described a case of primary cylindroma of sixteen years duration. It recurred twice the second time eleven years after reoperation. Necropsy showed metastases in the pleura and the lung.

BIBLIOGRAPHY

- 1 McWhorter G L. The Relations of the Superficial and Deep Lobes of the Parotid Gland to the Ducts and to the Facial Nerve. *The Anatomical Record* 12: 149 February 1917.
- 2 Grégoire R. Le nerf facial et la parotide. *Journal de L'Anatomie et de la Physiologie* 48: 437 1912.
- 3 Henle J. *Handbuch der systematischen Anatomie des Menschen*. Bd 2. Eingeweidelehre. Zweite Aufl. Braunschweig (Die Parotis S. 139).
- 4 Burrows H. *Pitfalls of Surgery*. Wm. Wood & Co. New York. 2d ed. 1925.
- 5 Stimson L A. Carcinoma of the Parotid. Successful Removal of the Entire Gland. *Medical News* 46: 414 1885.
- 6 Von Haberer H. Parotis hæmangioma. *Arch f klin Chir* 93: 825 1910.
- 7 Barbat J H. Complete Removal of Parotid Gland Without Injury to the Facial Nerve. *Calif State Med Jour* 14: 115 March 1916.
- 8 Burckhardt. Total Extirpation der parotis mit erhaltung des facialis. *Deutsche Ztschr f chir* 182: 416 1923.
- 9 Adson and Ott. Preservation of the Facial Nerve in the Radical Removal of Parotid Tumors. *Arch of Surg* 6: 739 May 1923.
- 10 Sistrunk W E. Mixed Tumors of the Parotid Gland. *Minn Med* 4: 155 March 1921.

- 11 Frank, J Primary Tuberculosis of the Parotid Gland, Ann of Surg , 36, 945, 1902
- 12 Kaufmann Spezielle pathologische anatomie, 6 Aufl , s 383, 1911
- 13 Nylander A Case of Parotid Cyst, Finska Lak Haulingar Helsingfors, 65, 297, 1923 Abst Jour Amer Med Assoc , 81, 1401, October 20, 1923
- 14 Prudden Rhabdomyoma of the Parotid Gland, Amer Jour Med Sci , 85, 438, 1883
- 15 Rennie, S J Enormous Fibrocystic Tumour in the Parotid Region, Brit Med Jour , II 1886, 717
- 16 Hutchinson, J Neuroma of the Parotid, Trans Path Soc of London, 37, 459, 1886
- 17 Chappel Removal of Parotid Tumour Without Application of Any Ligature Brit Med Jour II, 518, September 19, 1925
- 18 Bigelow Boston Med and Surg Jour , 68, 224, 1863
- 19 Barron, M Minn Med , 4, 160, March, 1921
- 20 Kennon Tumours of the Salivary Glands with Their After history, Brit Jour Surg , 9, 76 1921
- 21 Fraser, A Mixed Tumors of the Salivary Glands A Study Based on the Experimental Production of Neoplasm in the Submaxillary Gland of the Dog, Surg , Gynec , Obst , 27, 19, July, 1918
- 22 Gatewood Mixed Tumors of the Parotid Gland, Surg Clinics of North America, 3, 963 August, 1923
- 23 McFarland, J Ninety Tumors of Parotid Region, Amer Jour Med Sci , 172, 804, December, 1926
- 24 Collet and Bonnet Le Syndrome paralytique du cancer de la parotide, Lyon chirurg , 20 435, July-August, 1923
- 25 Lecene From Lecene and Leriche, Therapeutique Chirurgicale Masson & Co Paris 1926
- 26 Deane Boston Med and Surg Jour , 49 486 1854
- 27 Partsch Beitrag zur metastasenbildung der parotis cylindrome, Deutsch Zeitsch f Chir 183, 269 1923

**EPIDEMIC ACUTE SPASTIC COLITIS SIMULATING
ACUTE APPENDICITIS OR INTUSSUSCEPTION; AS-
SOCIATION WITH CERVICAL ADENITIS AND SLIGHT
PHARYNGITIS, PROBABLY ONE TYPE OF SO-CALLED
INTESTINAL INFLUENZA; A POSSIBLE FACTOR IN
EPIDEMIC APPENDICITIS**

RECENTLY I have seen a number of cases of acute colitis largely of a spastic nature in which the symptoms resembled acute appendicitis and in one case simulating intussusception. That I should operate upon Case I for appendicitis after seeing a number of others having a similar condition is evidence of the difficulty of diagnosis. A better understanding of this symptom-complex may avoid a number of unnecessary operations.

Intestinal symptoms, especially diarrhea, are not unusual during some epidemics of so called influenza, and the simulation of a surgical lesion should always be borne in mind. In the absence of an epidemic the diagnosis is more difficult, as in Cases II and V.

Case I—M D, female nurse age twenty nine years. Onset with pain over entire abdomen for a short time at about 2 30 o'clock in the morning two days before. Pain returned again after breakfast and remained continuously. The pain localized to the right side by night and persisted. It was so severe that she moaned aloud. At times the pain was more severe and after the first day was all on the right side. She was nauseated and vomited the day of onset after breakfast and also after lunch. This nausea continued but she stopped eating and the vomiting ceased. For the following twelve hours she had nausea and constant gagging. She had a headache. There was no fever at the onset but it was 100° F the second night. She was given $\frac{1}{4}$ grain of morphin by the house physician at 3 30 A M the second morning and again at 5 30 A M but was unable to sleep.

The bowels had moved regularly once a day before the attack. Two days before the onset her bowels moved but the movement was scanty hard and round. There was no further movement. She had had trouble off and on with constipation for many years and had taken cathartics occasionally or had permitted the bowels to go for two or three days without a movement.

Six years ago she had an attack of abdominal pain which localized in the right side. At that time the attending doctor said it was an attack of appendicitis. She was sick for two or three days. There had been no pain in the abdomen for the last two years she is quite sure. Nausea had been present once in a while for two years when she would think about eating. Appetite was poor and she ate very irregularly. Weight had increased considerably during the last three or four years to about 150 pounds.

The blood count on the night following the attack was 10 400 and the following morning 11 500 with 60 per cent polymorphonuclears. She did not work following the onset of the attack. History otherwise was unimportant.

The patient was seen by three resident doctors and during the night one of them considered an emergency operation on account of the severe localized pains with the constant gagging. Examination at 9 A. M. fifty four hours after the onset showed a well nourished woman who did not appear severely ill. The throat appeared negative and there was no soreness. The cervical glands could not be palpated but the neck was rather thick. Chest was negative. There was definite muscle rigidity over the right lower quadrant but not very marked. It did not seem to extend upward along the ascending colon, but was not limited to a small area. There was some localized tenderness. The abdomen was moderately fat and the colon could not be felt. The rectum was empty and negative on palpation.

With these findings and the history of a previous attack of appendicitis I thought it advisable to operate at once.

Operation—A muscle splitting incision was made under ether anesthesia. The appendix was exposed with difficulty due to a short mesentery. There was a short appendix linked

at its middle by the short mesentery and the distal end was partly obliterated by an old inflammatory condition. No acute inflammation was evident. The appendix was removed. The abdomen was explored by enlarging the incision so that a hand could be introduced. The cecum and first 2 or 3 inches of the ascending colon were distended with a soft doughy mass containing one or two harder masses. Above this the ascending colon, the transverse and the descending colon were contracted down to a cord like size, except where they tightly held small round, hard fecal masses at regular intervals of about every 2 inches. The sigmoid and rectum were empty and apparently were not contracted or spastic. The gall bladder was quite distended but otherwise negative to palpation. The stomach, liver, kidneys and pelvic organs were also negative to the examining hand.

Post-operative course was uneventful. An enema was given daily and after the fourth day the patient was without complaint. It is now over ten weeks and there is no further abdominal pain or evidence of a chronic colitis.

Case II—B M girl age fourteen years complained of pain in the epigastrium on arising in the morning. She did not feel well but ate some fruit for breakfast. The pain seemed to be more in the right side after two or three hours. The bowel moved about as usual. After six hours her temperature was 102° F. She had had no previous similar attack. She was seen by a physician who diagnosed acute appendicitis. The pain was so severe that he gave her $\frac{1}{4}$ grain of morphin.

I saw the patient in the hospital at midnight, seventeen hours after the onset. Temperature was 100° F, leukocyte count 8000. Urine was negative for pus but contained a faint trace of albumin. The pharynx was faintly red, the tonsils were enlarged and the cervical glands were just palpably enlarged. There was some tenderness and slight muscle spasm in the right lower quadrant, but it was not limited to a small area. The colon could not be palpated. Rectal examination was negative. I diagnosed an intestinal colic or colitis associated with a throat

inflammation The patient was kept under observation for three days and then sent home There was no more fever and the abdominal pain cleared up the next day

Case III—F H male age thirty five years complained of pain all over the abdomen coming on early in the morning The bowels moved twice and were moderately loose There was no relief of the pain after evacuation There was nausea and he took some peppermint water which was followed by vomiting The pain persisted and localized in the right side He had had no previous similar attack

Examination ten hours after the onset showed enlarged tonsils which were perhaps slightly reddened but there was no soreness The cervical glands along the posterior border of the sternomastoid muscle were palpable There was tenderness over the right lower quadrant and slight muscle rigidity The colon was not palpable The patient thought he had appendicitis I diagnosed it acute spastic colitis associated with a mild inflammation of the throat Two days later the pains were more on the left side of the abdomen along the descending colon There was no fever at any time The patient felt uncomfortably sick for about a week with gradually subsiding abdominal pain There was complete recovery

Case IV—E O male age twenty eight years stated that the onset was three or four days previously with general soreness in the entire abdomen accompanied by slightly more frequent bowel movements followed by constipation On examination he complained of a swelling with localization of severe soreness in the right side The pain was so great that he was unable to sleep the previous night The bowels had not moved for two days and he had taken an enema but it returned clear with no relief There was no nausea or vomiting Appetite was good and he was hungry throughout his illness He had had no previous similar attack and thought this was an attack of appendicitis

The throat was slightly reddened, but the patient had smoked regularly. The neck was quite thick and the glands were not palpable. There was marked soreness and tenderness with some muscle spasm over the right side, but it was all above the level of a line drawn between the anterior superior spines. The ascending colon above this line was palpable. It was hard and seemed edematous and moderately contracted. There was exquisite soreness on pressure over it as high up as could be palpated under the costal border. The transverse or descending colon could not be palpated and were not tender to pressure. There was no fever at any time.

I diagnosed an acute spastic colitis of the epidemic type. He was uncomfortably sick for three or four days more, with gradual and complete clearing up of the symptoms.

Case V.—E. S., male, age two years, entered the Presbyterian Hospital on November 23, 1924, with the history of persistent vomiting and abdominal distress coming on sixteen hours before. The baby was playing around apparently well, when he suddenly began to vomit. The vomiting was projectile in character and recurred every fifteen to thirty minutes at first, and persisted at intervals during the night and the next morning. The vomitus at first contained food, then green and yellowish water material, including all fluids given him. The attacks of vomiting left him very weak each time. He slept only three hours in all during the night. The bowels had not moved for a day and no blood was seen. Temperature the night before admission was 98° F. by rectum. Previously he had always been well and ate well.

Examination revealed a well-nourished child. The throat was slightly reddened. The ears were negative. The chest was negative. There was moderate distention and rigidity of the abdomen so that it was difficult to palpate. There seemed to be an area in the left lower quadrant more rigid than elsewhere and suggestive of a mass. The rectum was negative. The rectal temperature was 99° F. The leukocytes were 7500, hemoglobin 75 per cent.

In consultation with Dr Clifford G Grulee it seemed advisable with the probable diagnosis of an intussusception to perform an emergency operation because of the high mortality incident to delay in cases of obstruction

Operation—A suprapubic incision was made under local anesthesia There was considerable clear peritoneal fluid There was no intussusception to be found The appendix was negative The small intestine was collapsed There was considerable distention and fecal material in the transverse and descending colon but little in the sigmoid Exploration was all that was done

Postoperative Course—The temperature was 102° F the next day and there was some vomiting Following this there were no more abdominal symptoms and no fever One week after he returned home an abscess of one ear ruptured spontaneously and gradually cleared up It is now over two years and the child has had no further complaints

These cases illustrate a localized or general spastic colitis symptom complex type apart from the diarrheal and perhaps other types of so called intestinal influenza The characteristic symptoms of the acute spastic colitis type are the presence usually of a slight pharyngitis with definite cervical adenitis associated with an acutely inflamed spastic colon and usually constipation In the differential diagnosis one must rule out any acute surgical lesion especially acute appendicitis and in children intussusception (Table 1)

Diagnosis—The history of an epidemic of influenza with intestinal symptoms is of considerable value Occasionally in localities these epidemics occur with diarrhea having no definite throat symptoms They are particularly severe in large institutions Abdominal pain is usually the first symptom noticed in the spastic colitis type and there is extreme soreness over the entire abdomen but it tends to localize sometimes within a few hours to the right side occasionally to the left When there is a diarrhea at first the pains do not localize usually until constipation or spastic contraction of the colon develops Soreness is the chief complaint and it is less marked when

TABLE 1

Symptoms	Acute appendicitis	Acute spastic colitis (one type of intestinal influenza)	Intussusception
1 Pain	At onset in epigastrium or general localizing to region of appendix	General over abdomen or any portion of colon May localize to ascending colon after short time	Sudden onset Paroxysmal often
2 Nausea and vomiting	Usually in a few hours and not persistent	Usually absent and appetite good but both may occur especially after food or medication	Usually persists
3 Tenderness and muscle spasm	Both usually definite after few hours and persistent	Along all of colon or any part especially ascending portion Tenderness more marked than muscle spasm	Relaxed early tympanites later
4 Palpation	No mass until late	Contracted colon frequently	Tumor of abdomen early sometimes by rectum
5 Bowels	Early constipation frequent. Occasionally loose later	Some increased number of constipated or slightly loose stools early often with mucus Later constipated with mucus pus and blood occasionally	Early one or two loose Later bloody mucus
6 Prostration	Usually not marked early	Usually moderate early	Usually definite early
7 Temperature	Normal usually first three to twelve hours	Normal frequently at onset Usually 100° F rarely 101° F, first or second day	Frequently subnormal. Late rise
8 Leukocytes	Usually over 10 000 proportionate to other local symptoms polymorphonuclears high	Usually under 10 000 to 8000 Polymorphonuclears 60 per cent usually	Usually a rapid increase
9 Throat	Usually negative Occasionally history of recent sore throat	Usually slight redness of pharynx rarely acute respiratory symptoms Cervical glands are usually enlarged out of proportion to throat findings	Negative
10 Remarks	Sequence of symptoms important	Prevalence of epidemic with intestinal symptoms	Most common in infancy

quiet and in the absence of food. It may persist for several days to two weeks.

Usually in this type of acute spastic colitis one will find a slight redness of the pharynx or the tonsils and the cervical glands are definitely palpable and tender. Rarely do the patients complain of soreness of the throat or acute tonsillitis.

The temperature is usually normal or below at the onset, but may be 100° F., rarely 102° F., during the first or second

day Nausea or vomiting is rare but may be present after eating or taking medicines. The appetite usually remains good throughout but food is not tolerated well and increases the distress. The leukocytes usually vary from 8000 to 10 000 and the polymorphonuclears may be around 60 per cent. This is lower than would be expected in a surgical condition with an equal amount of tenderness. Usually there is extreme tenderness over a part or all of the colon. It has been noted more frequently localized over the ascending colon but may change. The colon may sometimes be palpated and is exquisitely tender. It is felt to be contracted or somewhat edematous and scybala may be felt. There may be distention or the entire abdomen is too rigid for palpation. Muscle spasm is usually less marked and not limited to a small area. Usually the entire side is rigid. The stools may have been slightly loose for a few days before the onset of constipation with the abdominal distress and general weakness. With the onset of constipation there may be no stools passed for several days. There is often a small hard fecal mass passed several times daily with some mucus or followed by a watery discharge. After a few days there may develop a mucopurulent slightly bloody discharge at the end of defecation even when only one or two scanty constipated stools are passed during the day. The stools may have a foul putrefactive odor. There is no relief following a movement but often a marked weakness. Weakness almost to prostration is commonly present throughout. This is quite out of proportion to the other symptoms. The duration of the spastic colitis is from several days to two weeks even in the absence of fever. It is easily aggravated by cathartics or food. Frequently other members of the family have had an attack of diarrhea which is a more common epidemic type than the spastic colitis. There have been no cases where this colitis has become chronic.

Pathology—The presence of pus and blood in the stools in some cases is evidence of an ulcerative process in the colon. This has occurred in both the spastic and the diarrheal colitis. It is possible that a local or reflex spasm associated with hard scybala in the colon similarly to fecaliths in the appendix may produce an

acute inflammation. Probably the colitis is primary and the spasm is secondary. The colitis may be due to bacteria or to a toxemia. The bacteria may be specific in nature or secondary invaders. The recognition of such an acute colitis sometimes localized to the ascending colon or possibly cecum and usually associated with a pharyngitis may throw some light on the etiology of appendicitis.

Epidemics of acute appendicitis have been described. It has also been recognized that some cases of appendicitis have followed an acute throat infection. Rosenow believes that bacteria may be carried to the appendix or colon by the blood stream. The frequent extensive involvement of this spastic type of colitis would tend to speak against a blood borne infection. It seems to me that inflammation which we frequently see involving the cecum with acute appendicitis may originate similarly. The most likely theory is that specific or secondary invaders have extended down the intestinal tract, because cocci not normally found in the appendix are demonstrated in its walls in appendicitis.¹ A spastic colitis similar to this type described may be a factor in the development of acute appendicitis where the cecum is involved. It may be possible for a severe spasm of the appendix to produce enough circulatory disturbances, perhaps even strangulation so that bacteria in the neighborhood may gain a foothold. It is possible that spasm due to cathartics producing circulatory changes as I have noted previously,¹ may produce an appendicitis. Trauma may also produce circulatory changes or spasm of a similar nature.

BIBLIOGRAPHY

McWhorter Golder L. Non perforative Appendicitis Followed by Peritonitis or Abscess. Illinois State Med Jour vol 40 109 August 1921

34-
1
3

CLINIC OF DR FREDERICK B. MOOREHEAD

PRESBYTERIAN HOSPITAL

OSSIFYING FIBROMA

It is interesting to note the discussion of this type of lesion in medical literature. With few exceptions the term "osteofibroma" has been used, and our principal reason for suggesting the term "ossifying fibroma" is to point out the fact that the evidence seems to point to the development of a fibroma which rather rapidly ossifies. In a series of over 20 cases we have come to the belief that the lesion starts as a fibroma either central in character or from the connective tissue of the maxillary, ethmoid, or sphenoidal sinuses. It is presumed that the central fibroma has its origin in the connective tissue of the blood-vessels.

We are reporting at this time 3 cases which have come to our service in the Presbyterian Hospital within two months. The first one, a girl nine years of age. In this case a swelling was noticed about a year previously, located in the parotid region. At first there was no pain or tenderness or functional disturbance. After several months pain and tenderness developed with a rise in temperature, which disappeared after a week or ten days. Several times during the remaining history, before operation, similar exacerbations were noticed, the mass increasing in size during the inflammatory period. The x ray showed very definite bone enlargement with what appeared like cystic areas, and it was first thought that the patient was suffering from either an osteitis fibrosa-cystica or an adamantinoma. At the time of operation it was discovered that the enlarged bone contained spaces, some of them as large as a filbert, filled with a myxomatous material. One of the spaces,

however, contained free pus which explains the inflammatory phase



Fig 278 --Case I

The second case a woman of thirty one with a history of swelling in the upper jaw extending over a period of two years,



Fig 279 --Case II

with a gradual increase in size, with no pain or tenderness or functional disturbance In this case the tumor mass extended

through the maxillary, ethmoid, and sphenoidal sinuses and filled the hard palate well beyond the median line on the opposite side. On the face side the growth extended up to the inner canthus, involving the nasal bone, and projected well above the lower border of the bony orbit. The tumor in all was as large as a good-sized orange.

The third case, a boy aged seven, had a tumor mass involving the lower jaw, which was first noticed about eight months before the child was sent to the hospital. The swelling was located in the body of the jaw from the region of the cuspid back to and



Fig 280—Case III

including the angle. The bony mass projected about an inch below the border of the jaw and an equal distance behind, and extended up to the sigmoid notch.

The surgical treatment in all our cases, including these 3, consisted in exposing the mass and chiseling away the excess bone to a point representing the normal contour and limits of the natural bone. We have been impressed with the fact that, with one exception, there was no recurrence, even though the remaining bony material was tumor tissue. We cite this to illustrate the fact that it is unnecessary to do a radical resection

for the treatment of an ossifying fibroma, and that one may be content with the removal of excess bony tissue provided the overlying soft tissues are saved and resutured in position. In removing tumors located in the upper jaw no external incision is necessary



Fig 281

The accompanying photographs and *x* rays serve to illustrate the location, extent, and character of the tumors

The histologic study shows the following interesting items

Case I In several sections of bone there are many bony trabeculae enclosing irregular islands of cellular structure. The trabeculae and cellular structure occur in about equal propor-

tions. Practically all of the trabeculae are covered by one or two rows of closely packed large deeply staining round cells (osteoblasts) with scant cytoplasm and in many places seem to fuse with the bony trabeculae to be replaced by bone. The cellular structure enclosed by the trabeculae likewise lies in close contact with the osteoblasts but on the side opposite the bone.



Fig. 282

This cellular structure consists of spindle or oval shaped cells separated by numerous delicate collagenic fibrils arranged either in whorls or parallel bundles. These fibrils in places tend to form pale pink homogeneous places. Blood vessels are relatively abundant in these cellular places.

Sections of the soft tissue consist of many stellate to spindle

shaped cells all lying in a bed of five delicate bluish pink loosely arranged fibrils between which are many fine granules. These fibrils and granules are almost homogeneous and form a background not unlike myxomatous tissue. This section is moderately vascular. At the periphery of the section the structure tends to simulate the cellular structure as already mentioned between the bony trabeculae.

Case II—Sections of the tumor show many anastomosing bony trabeculae laid down in a ground work of dense cellular connective tissue. This cellular tissue consists of spindle to oval shaped and even in some instances of round cells embedded in a network of collagenic fibrils arranged in whorls and parallel bundles containing many small blood vessels and generally merging with the bony trabeculae. In some places however and lying close to the bony trabeculae there are larger cells with larger and more darkly stained round nuclei (osteoblasts) forming definite collars about such trabeculae and merging with them. In still other places there are multinucleated (osteoclasts) cells whose nuclei are dark staining and round perhaps 5 to 10 per cell and in such places the cellular structure is scant and is not in contact with the bony trabeculae. Along one side of one section these bony trabeculae progressively diminish and the cellular structure predominates. Here there are only small islands of bone each completely surrounded by a collar of osteoblastic cells. Here no osteoclasts are seen these being present only in the part of the section where bone and cellular structure are in equal proportions or where bony tissue predominates.

We are indebted to Dr. Harry Oberhelman, pathologist at the Presbyterian Hospital for his assistance in the preparation and study of the tissues and to the house surgeon, Dr. Randolph F. Olmsted for a study of the literature.

BIBLIOGRAPHY

- Hildebrand. Lehrbuch Der Allg. Chir. 1909 p. 345.
 Das Osteofibrome des Oberkiefers Hippel R. Von Stschr. F. Mund und
 Kieferchir. 1915 1 110.
 A. Wyle. A Case of Osteofibroma of the Maxilla Jour. Laryngol. London
 1909 24.

- L. Monier Osteofibrome du Maxillaire Inferieur, Paris, Chir, 5, 842, October 24, 1913
- Mauclore et Maurel Osteofibrome du Maxillaire Inferieur, Bul et Mem Soc Anat de Paris, 88, 113-116, February 21 1913
- Uyeno Osteofibrom des Oberkiefers, Beitr Z Klin Chir, 1909, lxx, 2, 301
- Arthur Menzel Ein Fall Von Osteofibrom des Unterkiefers, Arch F Klin Chir, 1872, viii, 212
- Gagnier De L'Osteofibrom Du Max. Sup These de Paris, 1910
- Letenneur Fibrome Ossifiant du Maxillaire Sup, etc., Bul et Mem Soc. de Chir, Paris, 1875, N S, I, 2-6 1 pl
- Fibro-osteoma des rechten Oberkiefers, Jahresb u d Chir, Klin d Univ. Greifswald, 1888, 1889, 1890 16-18
- Sbulze Osteofibrome Maxillaire, Diss Greifswald, 1897

CLINIC OF DR. CARL B. DAVIS

PRESBYTERIAN HOSPITAL

CARCINOMA OF THE LOWER BOWEL

THE history, treatment, and subsequent record of this patient justifies a greater optimism in the treatment of carcinoma of the lower bowel than is prevalent in many minds.

This patient, a woman fifty-five years of age, had a record of bloody stools for one year before entering the hospital. Six months before admission a diagnosis of carcinoma of the rectum was established, and the patient was advised against operation by her medical attendant. Two weeks before entering the hospital she was seen by a consultant who advocated an attempt at removal.

A summary of her history shows a woman fifty-five years old, emaciated and weak, hemoglobin 75 per cent, red count 3,070,000, leukocyte count 5,200. The urine is normal. Examination of the head, neck, and thorax gives normal findings. The abdomen is scaphoid. The liver shows a smooth surface and edge. There are no palpable masses in the abdomen. The peritoneal cavity contains no free fluid. Rectal examination shows a tumor mass involving the entire circumference of the ampulla of the rectum at a point 2 inches above the anal orifice. The rectum is freely movable in the hollow of the sacrum. The tumor is fixed to the rectovaginal wall. On vaginal examination there is an indurated area in the posterior vaginal wall. Normal vaginal mucosa is present in the posterior fornix.

The patient was so weak that it seemed advisable to use a two-stage procedure. Under ethylene gas anesthesia a curved incision was made in the abdomen, extending from the symphysis to the outer border of the right rectus and back again to the

umbilicus By this incision the line of skin suture is removed as far as possible from the colostomy opening The abdomen was opened as usual between the recti muscles The anterior and posterior surfaces of the liver were smooth throughout The abdominal and pelvic lymph glands were normal A tumor mass could be palpated below the level of the culdesac, but the

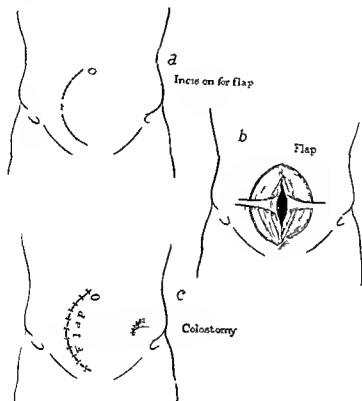


Fig. 283—*a* Skin incision *b* flap *c* flap sutured colostomy opening

peritoneum moved freely above the tumor and showed no fixation The bowel was incised at the level of the promontory The distal end was turned in and closed The proximal end was brought out through the left abdominal wall in such a manner that there was a large dependent loop left as an ampulla to accumulate intestinal contents

Following this procedure the patient was extremely weak. At the end of seventeen days it seemed safe to attempt the second procedure.

Under ethylene anesthesia with the patient on her face the sphincter was sutured, the perineum incised and the ampulla of the rectum, together with the posterior wall of the vagina, removed *en bloc*. The peritoneal coat was incised. The distal segment of bowel was drawn down as far as possible, the gut was amputated, and the stump brought out and sutured to the skin high up between the buttocks. The peritoneum was closed.



Fig 284 —A Colostomy opening

at a higher level on the bowel than normal. The vagina was closed with chromic gut. The pelvic floor was re established by heavy silk tension sutures. The skin was closed.

The patient showed less shock following this procedure than she did with the first stage. The patient was dismissed from the hospital some months ago and is now attending to the usual duties of her household and social régime.

This patient is now using a colostomy cup, and because of the dependent loop of bowel proximal to the colostomy she is able to accumulate feces in a manner that is comparable to the function of the ampulla. A cup is better than a colostomy bag.

in that the odor may be avoided much better. A colostomy bag must be of rubber and sooner or later this becomes impregnated with the odor of the fecal contents. A colostomy cup is spun metal and can be boiled and cleansed in a perfect manner. A colostomy that has been established by drawing the bowel through the abdomen in such a manner that there is a straight drop from the splenic flexure to the abdominal opening is a very unclean condition and is the primary reason why so many physicians shrink from advocating any type of an artificial anus. Most patients who have had this straight drop from the splenic flexure are more or less incapacitated most of the time. When a diarrhea or moderately loose condition of the bowel develops these patients are confined to their rooms. With a properly constructed colostomy it is possible for individuals to mix with the rest of the world on the basis of security that there will be no unpleasant accidents either through a loss of feces or loss of gas. A colostomy has a further advantage over the sacral anus in that it is easier for the patient to take care of it. It is under better visual control. The patient can develop a firm stool with diet or the use of bismuth powder and when flushing is employed the manipulation is much easier.

The advantages of the preliminary colostomy over the one stage operation are so well known that one is hardly justified in reenumerating them here. The advantage of the two stage operation in a weakened patient is quite obvious in this case. This woman was so weak following the abdominal procedure that it was a question for a few days whether she would survive or not. A total resection of the bowel in her case would almost surely have been fatal.

One more lesson to be learned from this patient is that a more optimistic attitude must be developed in estimating the difference between operability and inoperability. It is in this type of case that one is constantly called upon to judge of the relative value of the three criteria—immediate mortality, ultimate mortality, and restoration or preservation of function.

FOUR CASES OF TRAUMATIC INTESTINAL INJURY

THE records of the next 4 patients bring out the difficulty of early diagnosis in intestinal injury following external violence.

The first patient, a man approximately thirty-five years old, had a record of a severe blow on the abdomen. He was holding a piece of metal in a large pair of tongs beneath a steam hammer. The tool was torn from his hand and thrown against his body with considerable force. The man staggered back a few feet, but did not fall. He endeavored to return to his work, but after some minutes he felt faint and sat down. In a quarter of an hour he was suffering pain, a physician was called, and morphin was given. Following the use of morphin the pain disappeared and the man was sent to the hospital for observation. An hour after the injury he was admitted to the hospital with a normal temperature, pulse, and respiration. He stated that he had no pain, and on deep pressure over the entire abdomen stated he had but very little tenderness. The tenderness that was elicited was at the level of and to the left of the umbilicus. The skin at this area was abraded and showed moderate discoloration. The patient was catheterized. The bladder contained several ounces of normal urine. A leukocyte count made on admission showed 7000 white cells. Hemoglobin was 90.

The attending surgeon saw the patient again at 3 P. M., two hours after admission. The man had left his bed contrary to orders and had a record of a voluntary urination. Abdominal findings were approximately the same as on admission. At 5.30 P. M. he was seen again by the surgeon, and at that time it was necessary to awaken the patient to inquire concerning his condition. The tenderness in the abdomen was approximately the same. There was no rigidity. White count was between 6000 and 7000. Temperature was 99° F. and pulse was 90. A telephone report at 7.30 P. M. showed that the patient was the same as on last examination. At 9.30 P. M. the intern reported

that it was necessary to awaken the man to determine his condition. The patient still stated that he had no pain and had about the same degree of tenderness.

At approximately 2 o'clock in the morning the patient complained of severe pain. The temperature was 104°F and the pulse was 160. The white count had increased to 11,000. The patient was ordered to the operating room at once.

Under ethylene gas the abdomen was opened. The peritoneum throughout gave evidence of a violent peritonitis. Both parietal and visceral peritoneum were deeply injected and covered with a fibrinous deposit. Intestinal contents flowed through the abdomen. The small bowel had been torn across at a level of approximately 3 feet below the ligament of Treitz. The ends of the severed gut were found crushed and frayed. A lateral anastomosis was done. A drain was carried down to the culdesac. The patient was returned to his bed in fair condition. He died approximately twenty-four hours after operation. Autopsy showed the same conditions as described at operation.

Two weeks after the death of the patient described above a second patient was admitted to the hospital with a record of abdominal injury.

While lying on the motor house of a traveling crane he was crushed between the motor covering and an overhead beam. He was brought to the hospital two hours after injury. He had a record of a compressing force slowly applied between his back and abdominal wall. The force was exerted transversely across his abdomen from left to right. Following the injury it was with some difficulty that he was persuaded to enter the hospital.

On admission the temperature and pulse were normal. Leukocyte count showed 18,000. Urinalysis showed no red cells. There was a very moderate degree of tenderness in the upper right quadrant. There was no rigidity. It was decided to explore the abdomen at once. The patient joked and laughed with the assistants while being prepared.

Under ethylene an incision was made in the right rectus revealing a normal peritoneum throughout. The stomach and

intestinal tract were gone over for possible rupture. The bowel was found to be normal throughout. A small discoloration the size of a 10 cent piece was found in the right renal fossa. This area was seen to move about when the finger pressed upon the overlying peritoneum. Incision of the peritoneum showed the presence of both blood and bile. The duodenum was mobilized and the retroperitoneal side of the second portion of the duodenum was brought into view. A longitudinal slit 1 inch long was found along the greater curvature of the bowel. This was closed with three rows of linen. There was no peritoneum on this portion of the bowel and to make the suture more secure the bowel was brought down over the posterior parietal peritoneum in such a manner that the posterior parietal peritoneum covered the line of suture. The entire area was reinforced by suturing the omentum in the field. A small cigarette drain was placed in the right renal fossa well away from the line of intestinal suture. The patient showed no shock and exhibited a convalescence quite comparable to the average inguinal hernia procedure.

The third patient was brought to the hospital with a record of a very severe blow on the upper abdomen. He reached the hospital twelve hours after the injury.

He had a normal temperature and pulse. Leukocyte count was 18 000. There was no pain, tenderness or rigidity. Inasmuch as he reached the hospital a half day after his accident and showed no evidence of peritoneal or intestinal injury, it was deemed fair to keep him under observation with a careful hourly checking. This was done for the first twenty four hours after admission. The patient left the hospital on the third day with no complaint.

The fourth patient was brought to the hospital with a record of having been struck in the abdomen by a rapidly moving truck. He had been knocked down and when picked up was in a fainting condition. He complained greatly of pain in the right abdomen.

The man was brought to the hospital in an ambulance. He wept because of his distress.

Examination showed a normal temperature pulse leukocyte count and normal bladder and urinary findings. There was no rigidity. His tenderness was so marked that the man struck at the examining hand.

He was ordered for immediate operation but refused to leave his bed. Every effort was made to persuade the patient to consent because of the suspicion that he had sustained a bowel injury. The man persisted in his refusal and the following day demanded his clothing and left the hospital thoroughly exasperated with everyone concerned in the management of his case.

These four patients who entered the hospital on one surgical service within a period of thirty days are used as a unit of comparison. On checking over other injuries of this type that have appeared in the past on other services and on our own we find about the same average of variation. The wide variation in symptomatology is also reported in the surgical literature on this type of injury.

The condition of the first patient who was operated upon after a delay of twelve hours deceived us completely. Instead of having the picture that goes with a rupture of a duodenal ulcer or typhoid ulcer there was a very slow onset of symptoms. (Of course the morphin given immediately after the accident worked to a considerable degree to obscure the picture. We had been informed however that morphin had been used and felt that we were giving this element sufficient consideration in the diagnosis.)

The second patient who was operated upon immediately after admission made so little complaint that I am not sure that he would have been operated upon early if we had not had the experience of the previous week.

The third patient with a leukocyte count of 18,000 had a record of having had considerable amount of pain at the time of the accident but gave no evidence of a surgical abdomen on admission twelve hours after the injury.

The fourth patient suffered so greatly and presented so much difficulty on examination that we were unable to tell

whether fixation of the abdomen was voluntary or involuntary rigidity

After reviewing these injuries and others of a similar nature that have occurred in the last few years in the Presbyterian Hospital I am inclined to urge early operation in these cases even if there is a moderate amount of doubt as to whether the bowel has been injured or not. The chagrin of opening an occasional patient who does not show a rupture of the bowel is not comparable with the disappointment of operating upon a patient after the period of safety has passed.

CYST OF THE CEREBELLUM

THE next patient a young man twenty one years of age, was admitted to the Neurological Department with the following complaints headache for the last six months dizziness for three months diplopia for three months ataxia for three months Vomiting of the projectile type has been present for almost the same length of time as the headaches More recently there has been some stiffness of the neck The first severe headache was six months ago and was accompanied by vomiting The intense headache persists for a day to a day and a half At first there was an interval of three to four weeks between headaches Now they occur several times a week Each headache is accompanied by vomiting

In the last three months ataxia has gradually become more pronounced The man now walks with a drunken gait There is a history of loss of weight of 20 pounds Neck chest and abdomen are negative

Reflexes show the right and left patella increased The right and left cremasteric are increased Ankle clonus is increased in a moderate amount Plantar reflexes show flexion both right and left Finger to finger and finger to nose tests normal Pain sensation is normal throughout With heel to toe walking the patient falls to the left When either walking or standing the patient complains of dizziness There is no nystagmus or ocular palsy The patient can protrude the tongue normally There is no spontaneous past pointing with the right hand but with the left hand the patient invariably points to the right

Otologic examination shows

(1) The vestibular tests are quite atypical

(a) Duration of nystagmus after rotation shortened for both ears

(b) With spontaneous past pointing both hands pointing toward the center point to a central disturbance

(c) Failure to past point and false past pointing after rotation all point to the same conclusion

(d) Delayed weakened response to caloric stimulation of right ear and failure to get normal past pointing in stimulating each ear indicates some central interference with vestibular impulses

(2) Normal hearing response and the vigorous nystagmus after rotation demonstrate the normal labyrinth

(3) In view of the fact that we get a much slower response and weaker nystagmus in stimulating the right ear than in stimulating the left would suggest rather a right sided lesion

Ophthalmoscopic examination shows bilateral choked disk. There is not enough difference in the two eyes to indicate on which side pressure has originated

Urinalysis was negative blood analysis and blood pressure normal Wassermann—blood and spinal fluid—was negative

A diagnosis of tumor or cyst of the cerebellum was made and the patient was referred to the surgical side for exploration

The usual technic of exposing the cerebellum was employed. The posterior half of the foramen magnum was removed. As a further precaution against unequalized pressure a button of bone was removed and the right lateral ventricle drained. Approximately 30 c c of clear fluid were removed and sent to the laboratory. Following the withdrawal of fluid the dura was incised by one transverse and two shorter vertical incisions. The tentorium and cerebellum pontine angles were explored and found normal as far as exploration would permit. The under surface of the cerebellum was normal to palpation. Palpation of the two lobes seemed to show a firmer consistency of the left lobe than of the right. A needle was inserted into the left cerebellum and 30 c c of yellow fluid were removed. The needle was withdrawn. A hemostat was carried into the cyst and a good sized tract was opened up by forcible dilatation. The patient began to show signs of shock. The dura was approximated and the scalp sutured in place with silkworm sutures.

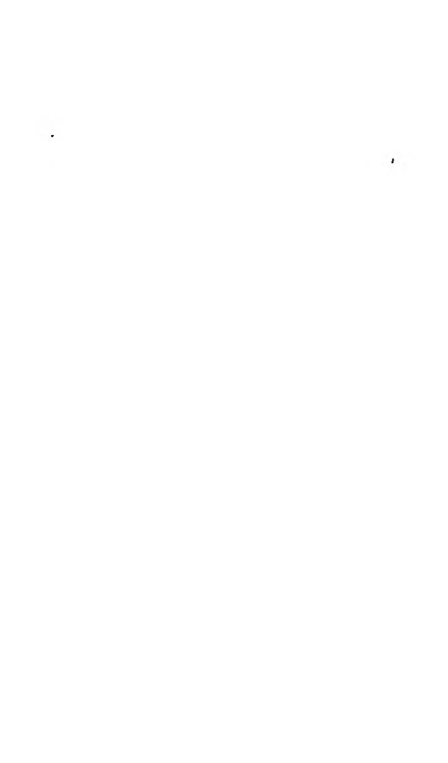
One thousand c c of salt were given under the skin in the operating room. Pulse was 142 and somewhat weak. Following the salt solution there was a gradual improvement which continued. The day after the operation the patient stated that the headache had disappeared. He was kept in bed for a week.

A month after operation he was showing marked improvement in his gait, a slight improvement in vision, and a complete absence of headache and dizziness. The wound was still discharging a small amount of serous fluid. Two months after operation the patient was able to walk a chalk line on the floor with but little difficulty. All discomfort had passed, but there was still deficient vision. Three months after operation the patient's gait had practically returned to normal for all practical purposes. There was still further improvement in vision. The patient was able to read newspaper print, but with some effort.

The problem then arose—would it be better to expose the cerebellum again and make a more vigorous effort to remove the cyst, or to merely postpone interference until the man showed some further difficulty. It was finally decided that it would be better to give the man every opportunity to develop as much improvement as possible, and if in time he showed a tendency toward a return of the pressure, it would be advisable to attempt a second decompression of the cyst by means of a needle rather than to attempt radical removal.

Five months have elapsed since the patient was operated upon. His condition was relatively good on his last examination. His only complaint now is he still has some difficulty in reading. Street vision is good. He has not returned to his occupation because of the decision of his parents.

Otologic examination made yesterday (March 9 1927) shows Spontaneous pointing shows marked improvement, rotation test of the vestibular function of right ear shows some improvement.



CLINIC OF DR. GATEWOOD

PRESBYTERIAN HOSPITAL

PLASTICS OF THE FACE AND JAW

OCTOBER 19 1926 Reconstructive surgery of the face has made tremendous strides since the beginning of the World War. Numerous articles, and a number of books dealing with this subject, have appeared in the last few years. Some of these plastics have been very ingenious and the results obtained little short of startling. However, the principles are, for the most part, old. I hope the 3 cases which I wish to show this morning will illustrate a few of these principles.

Case I—The first patient is a woman, seventy-nine years old, who developed an ulcerating lesion on her nose about ten years ago. An excellent dermatologist diagnosed the lesion as rodent ulcer and treated it with radium. The ulcer has been healed for the greater part of the time. Recently, however, it has broken down, and in spite of radium therapy has grown quite rapidly.

On examination, I find an irregular ulcerated lesion about 2 cm. in its greatest diameter. It has the characteristic appearance of an epithelioma with its ragged irregular walls and dirty base. The cartilage of the nose has not been perforated, although the ulcer seems to be quite deep. There are no palpable lymph-glands in the neck. This is not an unusual picture. The patient has probably had a basal-celled epithelioma, or Krompecher's tumor, which recently has gone over into the prickle-celled type. While pathologists differ about the microscopic interpretation of epitheliomas, some denying that these terms describe definite entities, nevertheless the clinical differentiation is very defi-

nite The prognosis follows closely the microscopic picture The basal celled epithelioma is slow in its growth and tends to heal in parts while breaking down in others Lymphatic involvement is always late and frequently absent The prickle celled variety never heals spontaneously, is more rapid in its growth and gives early metastases to the regional lymph nodes While one might in this case, expect to find lymphatic involvement if we have a prickle celled tumor, he should remember that as patients grow older the lymphatics atrophy and the glandular metastases come later This woman you recall is seventy nine

I have planned a plastic here along very simple lines Under procain anesthesia I am dissecting out the epithelioma including a wide margin of normal skin I have exposed the cartilage of the nose and find no evidence of malignant involvement Under the circumstances I feel that it will not be necessary to remove the entire cartilage or to remove any of the mucous membrane of the nose This simplifies my procedure considerably as it is necessary to bridge large mucous membrane defects with some sort of a flap or graft With a sharp knife I am shaving off the surface of the cartilage, removing the entire lesion in one block I am now making a tongue shaped flap—this should not be called a graft—on the cheek I have planned my incision considerably below the eye in order to prevent subsequent edema of the lower lid a trying postoperative complication The tongue shaped flap is made a little wider than the defect in the nose in order to allow for cicatricial contracture The flap is now securely stitched with fine silk thereby obtaining very accurate approximation of the mandible (Fig 285) Primary healing is important in obtaining a good cosmetic result

The postoperative care here is fully as important as the operation In order to obtain primary union it will be necessary to maintain an even pressure over the flap Owing to the age of the patient and the thinness of her skin even slight tension on the flap may be sufficient to cause necrosis I therefore am applying two strips of adhesive to which have been fastened hooks For this purpose one may use the ordinary device

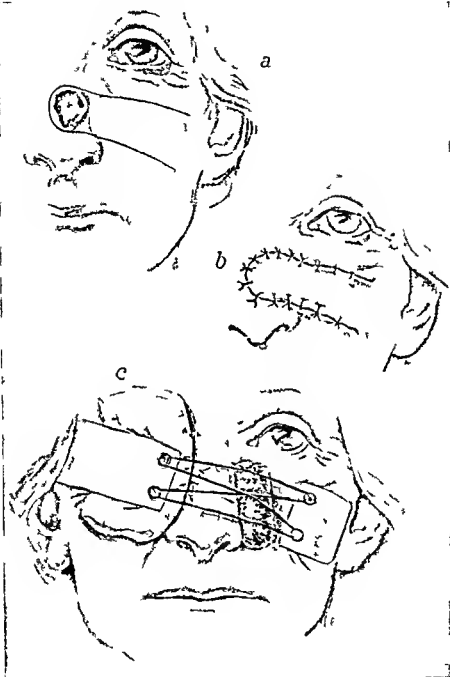


Fig 285

which cobblers make use of to set shoe hooks or one may sew on ordinary dressmakers' hooks. Having firmly secured the adhesive I am now twining over the hooks rubber bands. These serve two purposes. First it is the only method I know of by which even tension can be maintained at the base of the flap, second the elastics keep an even pressure on the sponge which I have placed over the flap. Davis of Baltimore and Vilray Blair of St. Louis have obtained remarkable results with Wolff grafts by using sea sponges to keep up an even pressure over the transplanted surfaces. By this method I expect to obtain primary union and eventually very little scar.

Postoperative Note—Microscopic sections show the typical epithelial pearls characteristic of prickly celled epithelioma. The scars on the patient's face have practically disappeared. There is a little shortening of the left side of the nose evidently due to the fact that the flap was not quite as wide as it should have been. There is no evidence of recurrence and the patient is well pleased.

Case II—This patient is seventy-two years old. He has been treated for a long time with radium and x-ray for an epithelioma of the lower lip. He was apparently well for some time but recently has had a small ulcer develop in the site of his old scar. There is no evidence of lymphatic involvement. Here again the age of the patient has helped prevent metastases although one must give radiotherapy its just due. As the patient already has a disfiguring defect I believe that wide excision with a plastic will give him the best chance of a cure and the best cosmetic result.

Brewer⁴ found after analyzing a series of several hundred cases of cancer of the lip, that 66 per cent of the patients who had no lymphatic metastases were well at the end of five or more years with only a local operation. Ninety-three per cent were well when a radical operation had been done. Where glands were present wide dissection gave comparatively few cures. Probably 30 to 35 per cent is a liberal estimate of five-year cures. Regional metastases appear in many cases within a

few weeks. This is due in part to the wealth of lymphatic protection, and perhaps also to the fact that the ulcerating lesion produces an inflammatory hyperemia of these lymphatic channels, the inflamed lymph-nodes furnishing a more suitable medium for stray epithelioma cells to begin their growth. These neoplasms are almost without exception of the prickle-celled type, and to me it is rather surprising that so large a percentage

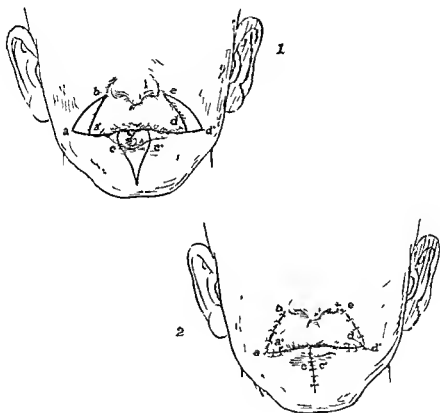


Fig 286.

is cured. The explanation, of course, lies in the early recognition and the prompt removal of an uncomfortable and unsightly lesion. I am convinced that proper radiotherapy, such as was outlined by Douglas Quick² in 1921 and Joseph Muir³ last year, will cure a considerable number of these cases. On the other hand, where an ulcer occurs producing a large defect and especially after radium has been used, wide resection seems more

that her chief complaint is difficulty in eating. On palpation I find that this mass is hard. It is evidently part of the mandible and is not attached to the skin. It involves both horizontal ramus and protrudes from the mouth much as a swollen tongue might do. There are two small lymph nodes just beneath the angle of the jaw. These do not feel like metastatic tumor glands and are probably due to tonsillar infection. Her blood picture is normal.



Fig. 288.—Photograph of the specimen after removal taken from above. Notice the regular arrangement of teeth on the left side (A) and complete absence on the right.

α Ray examination reveals a bony tumor with marked radiations. It is difficult to know whether the capsule of the tumor is preserved. The striations are suggestive of sarcoma. α Ray films of the chest are negative.

I had expected to find multilocular cysts in the α ray pic

ture. The history of six years' duration, in spite of the fact that the tumor has grown rather rapidly of late, makes me believe that this is not a very malignant neoplasm. The epulis type of tumor rarely attains this size and usually produces less bone thickening.

Typical adamantinomata arise from paradental epithelial debris. They may obtain enormous size and occasionally occur in children (Coate), although chiefly found in adults. They usually are cystic at least in part, and do not give the radiation seen in this x-ray. Odontomas almost always appear before the age of twenty-five and affect almost exclusively the lower jaw. They are characterized by the development of more or less atypical teeth. Occasionally the enamel may be missing and the tumor mass composed of masses of dentin and bone. Ewing designates such tumors as amorphous odontomas. The irregular position of the teeth and the fact that so many are missing might lead one to suspect this type of tumor. Careful microscopic study will be necessary to determine whether the tumor takes its origin from bone, paradental membrane, or enamel organ and pulp tissue. The predominant type of cell may vary greatly in various parts of the tumor. The microscopic sections which I have studied remind me of a case of Dr. Phemister's. He removed a tumor from the upper jaw which had been present for twenty years and which had recurred locally after two previous operations. The cells are predominantly of the spindle-celled type, almost myxomatous in places, with an occasional giant-cell. What bone is present looks as if it were very old and not osteogenic in character. Despite the resemblance of the picture to that of myxosarcoma I believe the lesion is benign, probably of the myxofibroma type.

After talking the matter over fully with the mother, we have decided to do a resection of the mandible. Under ether anesthesia I am making a 2-cm. incision in the episternal notch. The thyroid gland is retracted upward and the trachea opened in the midline, making a low tracheotomy. Having inserted a tracheotomy tube of good caliber, it is now possible to block off the nasopharynx so that there will be no likelihood of as-

pirating blood and mucus. An incision is now made beneath the angle of the jaw from one condyle to the other. The facial arteries and veins are picked up and ligated. The tumor mass is separated from the underlying tissues dividing the geniohyoid and the mylohyoid muscles close to the mass. As I free the mandible beyond the tumor I find that I can insert a heavy blunt needle such as we employ in making decompressions behind the ramus of the jaw. Attaching to this needle a Gigli saw, I am in a position to divide the mandible on the left side well beyond the tumor mass. I now do the same thing on the right side and it is possible to dislocate the mass forward so that I can remove the remaining muscle attachments. This has been accomplished without opening the tumor at any point. There has been no hemorrhage and the patient is in very good condition. It has taken so long however that I do not feel it wise to attempt any reconstruction plastic today. The field is more or less infected so that we shall wait until healing is complete before attempting a bone graft. I am therefore closing the mucous membrane with interrupted sutures which are tied so that the knots will come inside the mouth. The muscles of the floor of the mouth have been picked up and sutured to the muscles of the tongue completely obliterating the dead space. The platysma is closed and the skin carefully approximated leaving a wick drain in either end of the wound.

The postoperative care is just as important in this case as in the previous one. The tracheotomy tube will not be removed until the swelling of the tongue has entirely subsided and I am certain that there will be no difficulty in breathing. If no infection occurs I shall undertake reconstructive work very soon in order to prevent cicatricial contracture. I expect to use an autogenous graft taken from the ilium as described by Gillies.⁶ In the meantime I might make use of a dental prosthetic 'plumper' to preserve the contour of the jaw and help prevent contracture.

BIBLIOGRAPHY

1. Brewer, C. E. Carcinoma of the Lip and Cheek. Surg. Gynec. and Obst. 36: 169 February 1923.

- 2 Quick, Douglas Radium in Treatment of Epithelioma of the Lip, Jour. Radiology, 2, 1 No 11, December, 1921
- 3 Muir, Joseph Radio-active Substances Their Therapeutic Uses and Applications Radiology, 7, 51, 1926
- 4 Crile, G W Carcinoma of Jaws Tongue, Cheek, and Lips, Surg, Gynec., and Obst, 36, 159, February, 1923
- 5 Burow Described in Binne's Operative Surgery, Blakiston's Son & Company, Philadelphia, 1921, p 128
- 6 Gillies, H D Plastic Surgery of the Face, Henry Frowde, Hodder & Stoughton, London, 1920, p 180

CLINIC OF DR FRANCIS HOWE STRAUS

PRESBYTERIAN HOSPITAL

CARPAL INJURIES

I SHALL show you this morning 3 cases of carpal injuries. The first two are variations of a relatively common type. The last one is relatively rare.

Case I—The patient is a man of thirty three. Four days ago he attempted to open the door of a railroad freight car in order to direct its unloading. He slipped and fell a distance of about 4 feet. The force of the fall was taken on the palm of his left hand with the wrist in hyperextension. He suffered immediate severe pain, and noticed as soon as he picked himself up, that he could not completely flex or completely extend his fingers. Since that time the spontaneous pain has disappeared, but it recurs whenever he attempts to move the wrist or fingers.

With the exception of measles, mumps and scarlet fever in childhood his past history is negative.

He is a well-developed and rather obese man. The general physical examination and routine laboratory findings are essentially normal for his age, so we may confine our attention to his left arm. As I hold it up in profile it is obvious that there is a considerable amount of swelling about the wrist and over the dorsum of the hand. In spite of the swelling there is visible a definite rounded curve projecting dorsally of the type we habitually call "silver fork." But more careful inspection shows that the center of the projection is from $\frac{1}{2}$ to 1 inch distal to the point where we are accustomed to finding it in a Colles fracture. As I palpate the region I find that the swelling has not obscured the bony landmarks, and I can compare the injured with the

and a fracture results. Or in full dorsiflexion with either radial or ulnar deviation of the hand the distal portion of the navicular is carried back with the distal row of carpal bones while the proximal end is fixed by its ligaments. A bending fracture results.¹

When the same type of force is applied as in the previous injury with the hand in forced dorsiflexion and slight ulnar flexion the ligamentous attachment between the proximal row of the carpus and the bones of the forearm gives way. However the attachments between lunate and forearm are invariably stronger than those between lunate and the remainder of the carpus. The line of separation passes around the lunate leaving it in normal relationship with the radius while the rest of the carpus as a whole is displaced dorsally and toward the forearm. The head of the capitate which formerly lay within the distal concavity of the lunate now lies dorsal to its body and correspondingly closer to the radius. If the dorsal lunate radial attachment is impaired the head of the capitate may push the lunate anteriorly rotating it about its strong ventral ligamentous attachment to the radius. If this occurs the capitate comes to rest in the former bed of the lunate and the latter is rotated under the flexor tendons.² This variation of the injury may occur as an immediate result of the force applied or as a slow late effect of the pressure of the displaced capitate upon the dorsum of the semilunar.³ The ventrally rotated lunate is pushed forward so that it presses upon the soft parts on the anterior side of the wrist and causes the median nerve lesion which so frequently accompanies the injury.

The mechanism of the third group the perilunar dislocation in which the navicular is fractured and the proximal half of the navicular remains with the lunate is a result of combining the two preceding processes.

The treatment of simple fracture of the navicular has tended to become more radical during recent years. There is no question but that if the cases are recognized immediately and immobilized for a considerable period a majority will go on to bony or firm fibrous union and the patient eventually have a

perfectly useful wrist⁴ Peters⁵ reports 18 such consecutive cases in a single year. But the remainder especially if they have been unrecognized and not immobilized do not unite⁶. The wrist remains stiff and painful. Use of the fingers and hand is badly impaired. This condition tends to become permanent, and, in manual workers will cause total disability.

Investigation of such a case shows that one or both of the fragments has undergone a slow aseptic necrosis. There is marked absorption of bone substance often taking the form of a central cavitation. The cause of this phenomenon is comparable to that which renders likely the non union and slow necrosis of the disconnected fragment in an intracapsular fracture. The blood supply of the fragments is so impaired by the trauma and fracture that it is no longer adequate for nutrition. The wrist containing such a fragment undergoes a series of changes, which, if they are permitted to progress to a marked degree, are irreparable. A chronic inflammatory process is set up presumably by the traumatic irritation of the loose fragments. The remaining bones develop osteophytes. The ligaments become thickened and rigid. Functionally the joint has a limited range of motion and its utility as well as that of the hand is impaired. This unfortunate chain of events can be prevented by early removal of the fragments.

Excision of the navicular causes surprisingly little deformity, and very little interference with the strength and utility of the wrist. The period of disability is hardly longer than that of the prolonged period of immobilization required by the uncertain hope of obtaining union by the closed method. And the latter, if unsuccessful must be followed by excision to prevent permanent injury to the rest of the joint.

Somewhat the same problem presents itself in the treatment of perilunar dislocations. But in the uncomplicated case the indication for operation is not as definite. The fresh dislocation can usually be reduced by manipulation. Hyperextension, traction on the hand, and gradual flexion of the wrist, meanwhile accompanied by pressure on the palmar side of the wrist, will often serve to "pop" the carpus into place. In this connec

tion the method given by Speed ⁶ of rolling a small cylindrical body like a broomstick down the lower forearm and wrist is useful to press the lunate into place. In older untreated or unrecognized cases enough shortening has taken place to prevent replacement of the dislocated bone. In these cases it should be removed. The functional results after removal are excellent provided there is no nerve injury or contracture from its prolonged malposition. In recent cases which cannot be reduced by manipulation the displaced bone can be replaced by open operation but there are objections to this procedure. In some cases especially those where the lunate has been long out of place or has been rotated forward it undergoes the same series of changes as does a fractured navicular. This may cause a similar result to the remainder of the wrist and require similar treatment. Therefore in view of the good result following excision if open operation is necessitated it seems logical to avoid this possibility. In fresh cases where manipulation succeeds it may be used and excision resorted to only if x ray and clinical evidence prove a later resultant disease of the lunate. In this respect it is well to bear in mind that the arthritis due to disease of the lunate may not become evident until a considerable period has elapsed ⁶ and that if the remainder of the carpus has been badly damaged excision of the disintegrated lunate may not undo that injury.

If we accept the foregoing it seems evident that navicular fractures combined with perilunar dislocations should be handled by open operation. For after the reposition had been accomplished we should still have the problematic union of the navicular to deal with. Incidentally closed reposition is apt to be more difficult here than in simple perilunar dislocations. Excision of both navicular fragments and lunate leaves the patient with a strong mobile useful wrist. He will have a moderate and not unsightly radial deviation of his hand and a lessened range of extreme wrist motions. It will however be adequate for all ordinary use. Compared with closed reduction at best his disability period is not appreciably lengthened and at worst he is saved a long disability period and secondary late excision.

Operation —The patient is anesthetized and I shall now apply a Martin bandage. There are no blood vessels of any magnitude to consider in the field and the dissection is much easier as well as being safer from the standpoint of infection if sponging is avoided.⁶ Beginning at the fingers with wide spiral turns, I press most of the blood out of the hand and wrist. As I reach the forearm well above the wrist I make repeated light turns over the same area. Each turn superimposes its pressure over the turn beneath until the radial pulse disappears. These must be made rapidly, so that the interval between cutting off the venous return and later the arterial inflow will not be long enough to engorge the tissues. I then unwind the distal compression turns from the hand and wrist and proceed with my incision. Since this is a fresh case I can take the easier approach through the dorsum of the wrist. In older cases where fibrosis and contracture have occurred the capitate lies in the way of approach to the lunate and a ventral incision may be used.³ However, here I make a longitudinal incision about 2 inches long between the extensor indicis tendon on the ulnar side and the extensor longus pollicis on the radial side. The projecting displaced head of the capitate is level with the center of the incision. As I deepen the incision I identify the tendon of the extensor carpi radialis brevis and pull it to the radial side with the extensor pollicis longus. I am now down on the capsule of the wrist, which I open in the line of my incision. Projecting upward at me is the fractured surface of the distal portion of the navicular. As I take hold of it with my forceps I see that a large triangular fragment is lying entirely free from connection with either bone or ligament. I lift this out, and proceed to free the rest of the distal fragment from its ligamentous attachments. I do this with knife and scissors, being careful to hug the surface of the bone. Now I have removed this, and, by pushing the capitate distally, I can see the rest of the navicular and the lunate lying beneath the capitate. I can slip a periosteal elevator beneath them and, applying traction to the wrist while I press downward on the capitate, the head of the capitate slips into normal relation with them. I

now separate the remainder of the navicular and the semilunar from their ligaments and remove them. The capsule is closed with a continuous catgut suture including enough tissue to unite firmly the lower part of the annular ligament. In making the incision I divided one large subcutaneous tributary of the radial vein. This is ligated now but I shall not remove the Martin bandage until the skin is closed as I am confident that no other vessels will bleed after the bandage is applied. The skin is closed and I am covering the hand, wrist and fore arm with a firm flannel bandage. Over this I apply a starch bandage sufficiently heavy to give considerable rigidity to the dressing.

After treatment—In two days I shall remove the starch bandage and encourage the patient to move the wrist as much as he is able. As soon as the skin sutures are out I shall see that he is put through a full range of passive motion daily and still further encourage active motion without weight bearing. The patient is not a manual laborer. He should be able to return to his desk with his arm in a sling in about two weeks. He will have permission then to use the band for anything that he feels competent to do. If he were a manual laborer he would probably be able to return to work in six to nine weeks.

Case II—I have brought the second case back to show you largely to point the moral of the case I have just operated upon. This patient is a healthy man of twenty five. Previous to his accident his past history was entirely negative. Eight months ago a motor truck which he was driving turned over upon him. He received a severe scalp wound and a fracture of the right clavicle and was unconscious for two days. When he regained consciousness he noticed that his right wrist was painful and swollen. He complained of this to his attending physician and splints were applied with the idea that the wrist was sprained. During the next few weeks his other injuries healed but on several attempts to remove the splints from the wrist the pain recurred so markedly that they had to be reapplied. Two months after his injury he came to the Presbyterian Hospital on the service of Dr. Arthur Dean Bevan.

Examination at that time showed a thickened shortened wrist. Any motion of the wrist or partially flexed fingers caused severe pain. Except that there was no edema of the soft tissues the anatomic findings were the same as in the case I have just shown you. There was also a partial paralysis of the median and ulnar nerves distal to the wrist, which we thought due to overstretching during the injury, and which has since cleared up.

x-Ray films taken on his admission showed the same lesion as in the last case, but here there was a marked atrophy of the bones from disuse, with the exception of the proximal fragment of the navicular. This had retained approximately its normal

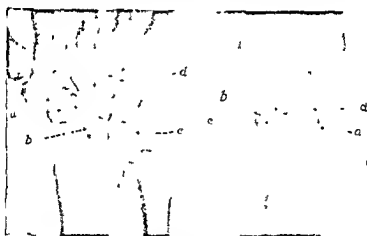


Fig 290—Case II a, Distal fragment of navicular, b, prox, c, lunate; d, capitate

density, in striking contrast to the rest of the carpus, because its blood-supply had been impaired. It was virtually a sterile sequestrum, and, like other sequestra, it had not undergone absorption as rapidly as the surrounding living bone.

The two fragments of the navicular and the lunate were excised. The patient made a good recovery from the operation, and has followed it with consistent efforts at active and passive motion. In addition, the contractures and some of the synovial adhesions have been freed by repeated manipulations under general anesthesia. Use of the wrist and hand has become much less painful than it was before operation. But he has regained

only about one half the normal range of motion in the wrist. The fingers cannot be completely flexed upon the hand. When I ask him to do such a simple thing as lift a heavy book, he does it with great difficulty.

This patient well illustrates what may occur in these cases when they are untreated or unrecognized. He has already suffered a long period of disability. He will probably improve still further in the future as far as strength and freedom from pain are concerned, but he will at best be left with a considerable permanent loss of function. The changes in the remaining carpal bones and ligaments during eight weeks of trauma will not be entirely repaired.

Case III—The third case is a man of forty three who works as a gardener. A year ago he fell out of a tree. The distance was about 10 feet and he broke the force of the fall with his left hand. He is quite positive that the weight was taken on the palm of the open hand. I saw him about three hours after the accident.

At that time there was some swelling on the dorsum of the wrist, most marked toward the ulnar side. He could move the wrist joint moderately without pain, but hyperflexion and hyperextension caused pain. Ulnar flexion caused severe pain while radial flexion did not seem to trouble him. There was a definite point of localized tenderness in the carpus just distal to the styloid process of the ulna. With my finger over this area I could detect bony crepitus when I moved the wrist joint.

Ray films showed a fracture through the body of the triquetrum. There was no displacement of the fragments except for several small splinters on the dorsal side of the bone. At that time I believed it possible that fracture through the body of the triquetrum might raise the possibility of non union and necrosis of a fragment for the same reason that this is true in fracture of the navicular. However the literature upon the matter is extremely scanty, so I immobilized the wrist and kept the patient under observation. I applied a light circular cast to the hand and forearm with the wrist in moderate ulnar

flexion Two weeks later this was removed and the man was returned to work with instructions to avoid using the left hand.

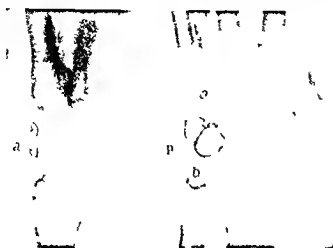


Fig 291—Case III a Fragments of triquetrum b lunate p pisiform

I am reasonably sure that he did not obey the instructions, as he insisted that the wrist was as strong as it had been before the accident and that its use did not cause pain



Fig 292—Case III a, Triquetrum b lunate p pisiform

Films taken a year after the accident show an apparently complete bony union There has been no damage to the remainder of the joint The wrist and hand are perfectly strong

and have full range of motion. The dorsally displaced splinters have largely been absorbed.

Discussion—Fracture of the triquetrum is one of the most uncommon carpal injuries. Wight⁷ in 1881 reported 2 cases. Early in this century with the increasing use of x rays more cases began to appear. Wittek,⁸ Lihenfeld,⁹ Oberst,¹⁰ and others reported cases. In 1911 Deneke¹¹ was able to gather some 17 cases from the literature. Subsequently Nast Kolb¹² reported 2, Maetzge¹³ 1, Destot¹⁴ 8, Mourgue³ (quoted by Destot) Peters⁵ 2, and Bum¹⁵ 1 case.

Deneke¹¹ divided triquetrum fractures into two groups. In the first group a fragment of the bone was torn off during a more complicated injury, usually some variety of perilunar dislocation. This remained with the lunate while the other fragment retained its relation to the distal carpus. In the second group the triquetrum was fractured by compression between the ulna and the hamate or pisiform. This form was very frequently associated with fracture of the ulnar styloid and if the force continued with fracture of the radius. Both Deneke¹¹ and Peters⁵ thought the mechanism to be one of forced ulnar flexion and dorsiflexion. This present case should be considered as belonging to the group of compression fractures.

The question should be raised as to whether compression fracture of the triquetrum is likely to eventuate in non union and later degenerative changes in the fractured bone and wrist joint. The outlook may prove to be similar to the better known possibilities in lunate and navicular fractures. In the cases cited previously 4 were studied by later x rays. Of these 3 showed no bony union and 1 showed bony union. In one of the 3 which showed non union it is mentioned that a fractured fragment showed very marked absorption but no mention is made of the condition of the fragments in the other 2. The late functional results were mentioned with regard to 6 (several months to a year). Of these 2 were reported as unimpaired. The remaining 4 showed varying degrees of limited motion and pain on use of the wrist. It must be remembered that most of these few cases had associated fractures of the ulnar styloid and some of them

were combined with fractures of the radius. It is noteworthy, however, that one of the two good functional results reported was in a case that had also fractures of the ulnar styloid and radius.

The late results were mentioned in comparatively few instances. It is likely that an undue proportion of any carpal fracture series consists of "sprains" which did not get well and that the simple fracture which unites readily is not as likely to reach the clinic.¹ But it is at least suggested that triquetrum fractures may suffer the same clouded prognosis as those of the navicular and lunate. Fortunately the present case is one example against that point of view.

BIBLIOGRAPHY

- 1 A. H. Todd Brit Jour Surg vol ix p 7
- 2 Max Hirsch Ergeb Chir u Orthoped Bd viii p 718
- 3 Codman and Chase Ann Surg vol xli p 863
- 4 E. B. Towne Surg Clin N Amer vol iii p 741
- 5 Peters Bruns Beitr Bd 170 p 373
- 6 Kellogg Speed Traumatic Injuries of the Carpus Monograph
- 7 Wight Med Gaz of New York vol viii p 93 Pathologist February 1881
- 8 Wittek Arch f Orthoped Bd 1 p 101
- 9 Lilienfeld Fort a d Geb d Ront Bd 13 p 138
- 10 Oberst Atlas d Norm u Path Anat in Rontgenstrahl xv p 266
- 11 Deneke Deutsch Zeitschr f Chir Bd 111 p 413
- 12 Nast Kolb Beitr z Klin Chir Bd 73 p 619
- 13 Maetzge Fortsch a d Geb d Rontgenstrahl Bd 14 p 266
- 14 Destot Lyon Chir 1921
- 15 A. Bum Wien Medizin Wochenschr Bd 71 p 42



CLINIC OF DR. ROBERT H. HERBST

PRESBYTERIAN HOSPITAL

ACQUIRED STRICTURE OF THE LOWER END OF THE URETER. THREE CASES

Case I.—E. S., a male aged fifty-eight years, entered the hospital for pyuria recently discovered at an insurance examination. He had had gonorrhea twenty-five years ago; a stricture of the anterior urethra was operated six years ago; stricture has recently recurred. It has been dilated up to the normal size of the urethra many times, but promptly recurs when sounds are not passed at frequent intervals. A bilateral vasotomy was performed for vesiculitis April, 1921; appendectomy and cholecystotomy three years ago, cystoscopy and x-ray three years ago:

Physical Examination.—Temperature 97° to 98.6° F., pulse 84-88, respirations 18-20, hemoglobin 95, leukocytes 5800, blood-pressure 120/70. Urine negative except for 300 cells per low-power field. Stricture F24 in anterior urethra 3 cm. behind meatus. A rectal examination revealed prostate moderately enlarged and somewhat harder than normal; both vesicles enlarged and hard, more marked on left side. Expressed smears showed many pus-cells.

Cystoscopy revealed a marked injection of the bladder wall, with moderate trabeculation. Number 5 catheters passed to the kidneys. In making pyelograms the left pelvis took 16 c.c. of 15 per cent. solution of sodium iodid, the right took 7 c.c. Cystoscopic urines were as shown in table on page 566.

In a left pyelogram (Fig. 293) the pelvis lay opposite the first and second lumbar vertebræ, of moderate size, and tended to be bifid. The superior calyx was rather long. The minor calices were rounded, especially those of the superior major calyx. The

	C b	Sm. a.	Cu. uret.	Cu. ure. p.
Bladder	460	Gram neg rods	Salmonella	Neg for tuberculosis
Right kidney	30	0	0	Neg for tuberculosis
Left kidney	2100	Gram neg rods	Salmonella	Neg for tuberculosis

ureter was dilated particularly in its upper portion the dilatation stopped abruptly opposite the ischial spine. Right pyelogram showed a normal pelvis and ureter.

Diagnosis Left infected hydro ureter and beginning hydro nephrosis due to stricture of ureter at its lower extremity.



Fig. 293—Ureteropyelogram showing stricture of the lower end of the left ureter with dilatation of ureter and pelvis.

Treatment consisted in cutting the lower end of the ureter through the cystoscope, dilatation of the ureter and lavage of the ureter and pelvis of the kidney. He is greatly improved.

From the history of this case and the clinical findings it is quite evident that the stricture of the lower end of the ureter was secondary to the infection of the seminal vesicle.

The relation of the lower end of the ureter to the seminal

vesicle is so intimate that infection in these organs not uncommonly invades the wall of the ureter and the course of development of a stricture is the same as seen in the urethra only there is a reverse order of things. In urethral stricture there is usually a destruction of the mucous membrane due to infection or trauma and this in turn is followed by infiltration of urine with its chlorid constituents which have the property of causing connective tissue proliferation with subsequent contraction. In these strictures of the ureter secondary to seminal vesicle infection the wall of the ureter is first infiltrated and this in turn is followed by infiltration of urine with connective tissue proliferation and contraction. Again in some of the cases the ureter may be bound down to the seminal vesicles due to a perivesiculitis and in this way obstruction is produced. Infections in the pelvis of the female and in the appendix may produce like changes in the wall of the ureter with subsequent narrowing and obstruction.

The course of these strictures is progressive and they may destroy the kidney by distention infection and atrophy unless relieved. These strictures may be filiform in size or may cause only a slight narrowing of the caliber of the ureter. They may involve only a small segment of the ureter or may extend a number of centimeters along its course.

The symptoms are those of upper urinary tract obstruction. Pain may be present in the lower abdomen and may radiate along the course of the ureter to the kidney and downward to the thigh and external genitalia. There may be acute intermittent attacks with dull aching pains in the intervals. There may be associated bladder symptoms such as frequent imperative urination with pain.

Gastro intestinal symptoms are not uncommon and chills and fever may be present when infection occurs.

Tenderness in the region of the kidney and along the course of the ureter is often found and in advanced cases the kidney may be found enlarged on palpation.

There is no question that strictures and infections of the upper urinary tract are frequently secondary to infection in the

lower urinary and genital tracts and a persistent pyuria in cases where the infection in these tracts has been eradicated should lead one to a study of the ureters and kidneys.

The diagnosis of these strictures can be made from the symptoms and the obstruction to the passage of ureteral bougies but this obstruction must be visualized in a ureteropyelogram which should show a dilatation of the ureter above the point of narrowing.

The ureteropyelogram will aid in making a differential diagnosis from spasm of the ureter and interureteric muscle.

The treatment of these strictures is gradual dilatation with bougies and if infection complicates the kidney pelvis and ureter may be irrigated through the ureteral catheter followed by instillation of silver nitrate solution. In cases where the stricture extends down to the ureteral orifice time may be saved by cutting the lower end of the ureter through the operating cystoscope. If the obstruction has caused infection and destruction of the kidney beyond repair nephro-ureterectomy is indicated.

Case II—A male forty years of age entered the hospital complaining of pain in the left flank and abdomen and vomiting which began two days before following severe strain lifting a stove.

The history was negative except for an operation for a ruptured appendix five years ago, mumps and measles and one attack of gonorrhea five years ago which was rather protracted.

The physical examination was negative except for the following: Slight rigidity and tenderness in left flank. Temperature ranged from 97° to 100.2° F., pulse 60 to 84, respirations 18 to 20, hemoglobin 85 per cent, Leukocyte count 17,600, blood pressure 111/60. Urine cloudy, pus, few red blood cells, albumin present, acid, specific gravity 1.022. Plain x-ray: A dense shadow was present on the left side just below the level of the transverse process of the third lumbar vertebra. Two small shadows were seen in region of the kidney.

Cystoscopy showed some bulging of the bladder wall just above the left ureteral orifice. A small collection of fine urinary

sand escaped from the ureter as a No. 6 catheter was passed to kidney on the left side. Plain x-ray showed the catheter lying against the dense shadow previously mentioned. Collected urines showed:

	Cells	Culture	Smear
Bladder	140	Staph	Staph
Right kidney	0	0	0
Left kidney	90	Staph	Staph

Five c.c. of sweet oil were injected into the ureter and the patient left the hospital. He returned August 20, 1921, complaining of abdominal pain low down on the left side, radiating to the scrotum, and nausea and vomiting. Temperature 102° F., leukocytes 16,400, blood-pressure 110/60. Urine fairly clear, with a few leukocytes and casts, but no albumin or blood.

Cystoscopy.—Bladder appeared the same as on previous cystoscopy; No. 5 shadowgraph catheter was passed into left ureter to kidney. A fairly dense, rather rounded shadow was seen just below the left sacro-iliac joint and in close proximity to the ureteral catheter.

Sweet oil was again injected and the symptoms subsided.

Dilatation of the ureter, followed by oil injection, was repeated several times without change in position of the stone, so it was removed by extraperitoneal ureterotomy, following which the patient was free from symptoms for three years. In July, 1925 he entered the hospital again, complaining of pain in the left lower abdomen which radiated up into the flank. At times he was troubled by a recurrence of a seropurulent discharge from the urethra. Cystoscopy was done and pyelograms made. The left pyelogram (Fig. 294) showed a hydro-ureter and a pelvis somewhat enlarged. The ureteral dilatation began just above the ischial spine and extended up to the kidney. Believing that we had to deal with a stricture of the lower end of the ureter, bougies were passed at weekly intervals. Following these dilatations a small stone was passed. The symp-



Fig. 294 — Retrograde pyelogram of stricture at the lower end of the left ureter with dilatation of the ureter and pelvis

torns subsided and a pyelogram made three months later showed the ureter nearly normal in size. About one year later the patient again returned to the hospital complaining of left sided pain, chills and fever. A pyelogram showed the ureter to be



Fig. 295 — Retrograde pyelogram of the ureteral stricture shown in Fig. 294, taken several months later after dilatation of the stricture.

dilated again, with the obstruction at about the same level as before. He stated that the discharge from the urethra had again recurred. Rectal examination revealed a prostate gland slightly enlarged. Both seminal vesicles were enlarged and hard, more marked on the left side. Expressed secretion from these organs showed many pus cells but no diplococci of Neisser.

The lower end of the ureter was again dilated with bougies and the prostate and vesicles massaged every third day with a prompt subsidence of the symptoms (Fig. 295).

From the history of this case and the clinical course it is quite possible that the recurrence of the stricture of the ureter was due to the infection going on in the seminal vesicles. This patient gave a definite history of prostatic gonorrhea with recurrence of the serous discharge. The formation of stone in the kidney and ureter may easily be explained by the urinary retention produced by the stricture. Had we given attention to the infection in the seminal vesicles when the stricture was first found the subsequent recurrences might have been prevented.

Case III—A male thirty eight years of age entered Presbyterian Hospital, November, 1923 complaining of pain in the lower left quadrant of the abdomen radiating upward to the kidney region. The family and personal histories were negative except for an appendectomy for acute appendicitis eight years before. Three days prior to hospital admission he had a similar attack of pain in the left abdomen and left lumbar region, accompanied by nausea, vomiting, and tenderness below the twelfth rib. No urinary symptoms were present at any time. Five years ago he contracted a gonorrhea which was complicated by a left scrotal swelling, which he stated was operated and atrophy of the left testicle followed. Since the attack of gonorrhea he has had a slight intermittent urethral discharge.

The physical examination revealed tenderness in the left lumbar region. The left testis was small and soft. Rectal examination showed prostate enlarged and harder than normal,

the seminal vesicles were enlarged and hard, especially the left. Expressed material from these organs contained many pus cells. Temperature 97° to 99° F, pulse 60 to 80, respirations 18.

Urine—Thirty five cells per low power field, otherwise chemically and microscopically negative. Hemoglobin 92 leukocytes 15,700 blood pressure 112/80.

Cystoscopy—The bladder was normal except for a slight injection in the region of the left ureteral orifice. Number 6 shadowgraph catheters were passed the right reaching the kidney the left stopping at 22 cm. The findings of urines collected at cystoscopy were as follows:

	Cells	Culture	Smears for tuberculous	Cultures
Bladder	200	Staph albus	0	Neg for tb
Right kidney	30		0	
Left kidney	1650		0	

A left pyelogram was made 40 c c of 15 per cent sodium iodid solution being injected without pain. The pyelogram (Fig. 296) showed a stricture of the left ureter in its lower ex-



Fig. 296.—Retrograde pyelogram of a stricture at the lower end of the left ureter showing the dilated ureter and pelvis.

tremity, hydro ureter above the point of narrowing, and hydro nephrosis, and the high cell count on this side indicated an infection

From the history and findings in this case it is reasonable to assume that the obstruction in the lower end of the ureter was secondary to the infection in the seminal vesicle

Treatment directed to these organs during the early course of the disease might have prevented the development of the ureteral stricture

This case left our service before treatment could be instituted. We would have treated him by repeated dilatations of the strictured ureter followed by lavage of the renal pelvis and ureter, and routine massage of prostate and vesicles

HERNIA OF URINARY BLADDER

A CASE of hernia of the urinary bladder associated with right inguinal hernia, acute urinary retention, benign prostatic hypertrophy; left inguinal hernia, postoperative ventral hernia, duodenal ulcer

This man, seventy-five years of age, colored, entered the hospital complaining of gastro intestinal symptoms and abdominal pain, bilious attacks and vomiting, somewhat painful, urgent, and difficult urination, and nocturia

History.—Chickenpox, measles, muscular rheumatism. Appendiceal abscess and appendectomy in 1909 Double inguinal herniæ Right appeared in 1908 and was operated in 1909, recurred, and has been large for some time Left-sided hernia appeared in 1922

Physical Examination.—Epigastric and inguinal herniæ the right extending into the scrotum Palpation of the right scrotum revealed fluctuation and on percussion the area was flat The bladder was markedly distended and upon catheterization 1000 c c of urine were obtained Following catheterization the size of the right inguinal hernia was somewhat reduced The urine at times showed some albumen and a few casts Hemoglobin 95, red blood-cells 4 800,000, white blood-cells 11,200, blood pressure 120/80 Complete retention of urine, 1000 c c obtained with catheter

Blood Chemistry.—Urea nitrogen 18.02, uric acid 3.73, creatinin 1.33, non-protein nitrogen 37.36, carbon dioxide 49.4, sugar 121.9, chlorides 445 Bladder phthalein .47 per cent in two hours

Rectal Examination.—Prostate was moderately enlarged, symmetrical, soft, smooth, and not fixed—findings compatible with a diagnosis of benign hypertrophy

Cystoscopy.—There was a marked projection of the prostate into the bladder, with a deep notch in the left lower quadrant, and one also in the midline anteriorly The bladder was in-

jected cystitis two plus Trabeculation was marked An opening was seen in the posterior wall of the vertex, slightly to the right of the midline This opening differed from the usual diverticular opening in that it appeared to be pulled to one side (the right)

Cystoscopic urine

	Cels	Smears	Cultures	Direct smears	Guinea pig
Bladder	370	Gram positive rods and cocci in pairs	B proteus	No tb	Neg

A cystogram was made with the bladder filled with 15 per cent sodium bromid solution The bladder was large and fairly regular in outline On the right side was a large pouch like pear shaped projection extending downward 14 cm below the bladder, the lower pole lying below the level of the pubis After emptying the bladder the pouch still showed almost complete retention

Diagnosis—Hernia of bladder or traction diverticulum of bladder

Hernia of the bladder may be divided into three types

1 Intraperitoneal in which that part of bladder covered with peritoneum is drawn into the hernial sac—oblique hernia

2 Extraperitoneal in which the bladder prolapses without a peritoneal sac—direct hernia

3 Paraperitoneal in which the bladder wall becomes adherent to a peritoneal hernial sac These may be direct or oblique hernias

Modern urologic study is of great assistance in the diagnosis of hernia of the bladder and all herniæ associated with urinary symptoms should be studied cystoscopically as well as roentgenologically (cystogram)

The more common signs of hernia of the bladder should be looked for such as diminution in the size of the hernia during micturition the desire to urinate produced by pressure on the hernia and the two act type of micturition

Hernia of the bladder may be classed as a form of traction diverticulum, and on cystoscopic examination one usually sees an opening which differs from the other forms of bladder diverticula in that the edge is puckered as though part of the bladder wall had been pulled out. A cystogram gives added information in that it shows the size and shape of the bladder part of the hernia, and by taking a second film after emptying the bladder one can see the retained contrast fluid in the hernial sac when this fails to empty with the act of micturition.

If a urologic study is carried out in all cases of hernia in which the symptoms or signs suggest an involvement of the bladder, the accidental opening of this organ during the herniectomy can be avoided. The cystogram is also helpful in planning the best method of handling the bladder part of the hernia. Bladder hernia may be classed as traction diverticula, and after being freed from the hernial sac and surrounding tissues should be excised at the neck and the opening in the bladder closed.

ureter reached to the level of the fourth lumbar vertebra, the one from the right side crossed over to the left in front of the sacrum and stopped at the lower end of the left sacro-iliac joint. The two kidney pelvis lay on the left side, one overlying the crest of the ilium, its pelvis large with large clubbed calices, the other located at the level of the second and third lumbar vertebrae, also appeared to be dilated. The upper of these two pelvis was turned toward the spine and its calices were directed outward though not so straight as is usually seen. The ureter of this kidney was slightly dilated and was kinked at the level of the lower end of the left sacro-iliac joint. Above this kink the ureter made a wide sweep outward; below the kink it was in the usual position.

Cystoscopic urines

	Cells	Smear	Cultures	Fungus tuberculous
Bladder	30	0	0	0
Right kidney	40	0	0	0
Left kidney	40	0	0	0

In one specimen of bladder urine colon bacilli were found
Phthalein output

	Right kidney	Left kidney
Appeared in	5 minutes	4½ minutes
First 15 minutes	1.3	0.8
Second 15 minutes	4.2	6.4
Second 30 minutes	9.8	10.2
Total 1 hour	15.3	17.4
		32.7%

This patient was seen again one year later. During the interval she had enjoyed good health. Cystoscopy, catheterization and pyelography showed her abnormal kidney condition practically unchanged. The urines were as follows:

Bladder 3 cells, right kidney urine 7 cells, left kidney urine 17 cells, a few blood-cells, no sugar or albumen. The phthalein output was about the same as on previous examination.

Diagnosis.—Right crossed dystopic kidney with slight hydronephrosis. Hematuria.

No operative interference was recommended in this case, owing to the fact that both of these kidneys were functioning quite well and apparently were not infected. However, she was advised to return at intervals for study.

Crossed dystopia is a comparatively uncommon anomaly of the kidney. There are less than 100 cases reported in the literature. In the majority of the reported cases the two kidneys are fused. In this case the kidneys are not fused, because in some of the films the outline of the lower pole of the upper kidney can be seen and is evidently not connected with the lower kidney. The crossed kidney is practically always in the lower position. In some cases of crossed dystopia the fusion is lateral. The anomaly of crossed dystopia even when the two kidneys are fused is a distinctly different condition from the more common renal anomaly known as horseshoe kidney, where there is a fusion of either the upper or lower poles of the kidneys across the midline of the body.

The x-ray film and pyelography are necessary in the diagnosis of crossed dystopia. In our patient it was quite evident from the symptoms of pain associated with hematuria that the tumor felt in the abdomen had something to do with the kidney. The x-ray and pyelographic studies showed very clearly the anomaly. They also showed that the drainage from both kidneys was not badly disturbed. This, coupled with a fair phthalein output from each kidney, blood chemistry within normal limits, and sterile urine obtained by ureteral catheters, all speak against any operative interference at this time. Her pain has greatly decreased in the last year and the intermittent hematuria is so slight that it does not disturb her general health.

CLINIC OF DR KELLOGG SPEED

PRESBYTERIAN HOSPITAL

A NEW TYPE OF FRACTURE OF THE CALCANEUS, WITH DISCUSSION OF THE COMMON INJURIES OF THIS BONE

ALL men interested in traumatic surgery are compelled to pay attention to fractures of the calcaneus which come to them. Fractures of this bone have engaged the attention of surgeons for centuries and the disabilities resulting from them have been most emphatically recognized since compensation laws in our several states force settlements for injuries on a basis of permanent disability. Among my acquaintances who are fracture fans the question always bobs up during a lull in the conversation 'What do you do with your patients who have a fracture of the calcaneus and what are your results?' Slowly the importance of injury to this bone has been forced upon us until we all feel that we can recognize fractures of the heel bone and be guarded in our prognosis. Whether or not the last word has been said about treatment of compression fractures of the calcaneus remains to be seen. Some of the most intelligent observers of this injury differ widely in their line of treatment and it is found difficult to compile a large series of these fractures from the standpoint of real end results in any hospital or clinic.

It is my purpose at this time to call to your attention an unusual type of fracture of the calcaneus first because it is difficult to recognize even with the help of the roentgenogram and secondly, because overlooking it leads to a prolonged disability. Early recognition promises the best prognosis of all fractures of this bone. Two instances of this unusual fracture

have recently been observed by me probably others have been overlooked in the past

The first patient was a male clerk in the post office, aged fifty two years In December 1926 while building a small house during his spare time he fell about 7 feet from a scaffold to the ground receiving the impact of the fall on both feet, possibly more on the left than the right but of that point he was not



Fig 297 —Lateral view of fracture of calcaneus Case I The broken fragment has been displaced forward and downward undoubtedly pulled by the attached fascia and plantar muscles

sure After picking himself up he returned to his carpenter work for an hour although he found that there was pain in the left heel region just below the ankle When he took off his shoe the left heel was swollen and tender below the external malleolus, but there was no ecchymosis

Knowing that his work called for standing and constant moving about he went to see his doctor that night so that he would not be disabled The doctor examined his foot found some

swelling and tenderness in the region mentioned, diagnosed a bruise, and sent the man away. No roentgenogram was taken.

The patient found that the next day he could not walk without pain, and consequently he was unable to go to work. After temporizing for two weeks, soaking his foot in hot water



Fig 298—Lateral view of the heel of the second case. No fracture is apparent.

and rubbing it with liniment, he returned to the doctor, who placed the foot in a plaster-of-Paris boot which was worn for three weeks.

After the plaster was removed no pain or tenderness and no swelling were present. He returned to work and found that soreness in the heel rapidly appeared—simple standing causing

nearly as much distress as walking. A roentgenogram was then taken with findings as shown in Fig. 297.

The patient was referred to me about this time and my examination showed very little if any swelling in the left heel, no variation in the height of the malleoli from the plane surface of the examining table when compared to the uninjured foot, and no pain to pressure just under the external malleolus. There was tenderness, however, on pressure at the outer edge of the



Fig. 299.—Three-fourths lateral view of the heel of Case II. This brings the full profile of the tuber calcanei into view and the fragment broken away from the bone is apparent.

heel just under the anterior border of the calcaneus. To this same spot was referred pain after standing or walking. No bony thickening or projection could be palpated through the plantar tissues. The remainder of the heel bone, the joints of the foot, and the soft tissues were normal.

Before commenting further on this injury let us consider the second case. My interest in the first one was unusual, because

I had never seen a like fracture and found that my colleagues had never seen one with the same bony pathology. Within two weeks after this first case, through the kindness of Dr McKee, I ran into a second.

This second man was at work in an elevator in a building under construction when something went wrong with the mechanism causing the elevator to descend very rapidly to the bottom



Fig. 300—Shows the arrangement and origin of the plantar tissues involved in this fracture of the calcaneus. The broad insertion of the plantar fascia, flexor brevis digitorum, and abductor of the little toe affords the overstrained muscles an opportunity to pull off a bone fragment.

of the shaft, a distance of about 50 feet. During the descent the man stood holding his weight on his toes and keeping his knees slightly flexed, but the impact caused by the elevator striking the bottom of the shaft forced his heels to the floor of the elevator and transmitted his body weight through them in the sudden stop.

He was taken at once to a hospital where roentgenograms of both feet were made although there was much more tenderness in the right than the left heel. The roentgenograms of both feet in both anteroposterior and lateral views failed to show any evidence of fracture (Fig 298).

The symptoms of localized tenderness and pain at the anterolateral margin of the right calcaneus continued and all attempts at use of the foot failed because of pain. There was no evidence of avulsion or compression fracture of the calcaneus. After two weeks of expectant treatment he was eventually subjected to another roentgenologic examination in a manner to be described with the result shown in Fig 299.

CLASSIFICATION OF FRACTURES OF THE CALCANEUS

For the last fifteen years in teaching students I have been using a simple classification of fractures of the heel which seemed to cover all the injuries from a practical standpoint.

- 1 Avulsion fracture
- 2 Fracture of the sustentaculum tali
- 3 Fracture of the trochlear process
- 4 Compression fracture

AVULSION FRACTURES OF THE CALCANEUS

Avulsion of the calcaneus is one of the best and longest known fractures in medical literature. Hypercontraction of the calf muscles transmitted through the tendo achillis sometimes aided by some sudden impact from a fall causes the powerful tendon to pull off from the body of the bone either a shell of the posterior surface or quite a large mass which is elevated out of position pulled by the contracting calf muscles. This shell separation in an adolescent may pass through the epiphyseal plane which lies close to the posterior margin of the bone.

When this fragment is thus pulled up two pathognomonic signs appear the normal hollows about the tendo achillis looked at from the rear are lost. They are filled by bone fragment and extravasated blood and the tension of the tendo achillis

on the injured side where the bone has been torn away becomes lessened. This can be appreciated while palpating the two tendo achillis as the patient stands on both feet and is called Hoffa's sign. The malleoli of the injured ankle are no nearer the standing surface than those of the uninjured side.

Treatment of Avulsion Fracture—Treatment of avulsion fracture is operative. An incision parallel to the tendo achillis on the inner side extending about 3 inches down to the heel exposes the fragment with its attached tendon. A tenotomy of the tendo achillis is performed. The foot is brought into smart plantar flexion, and the bone fragment is shoved down into contact with the major portion of the bone where it may be held by catgut through and through sutures or by an ivory peg driven through the body of the bone. After closing the wound the foot is held in plantar flexion by a plaster boot which extends above the flexed knee.

Weight bearing is not permitted for from ten to twelve weeks. The results are good.

FRACTURE OF THE SUSTENTACULUM TALII

These fractures are caused by a sudden forced inversion of the foot as in falls on an uneven surface or edge, the majority of the force of impact being applied to invert the foot. The calcaneus is not consequently compressed as a whole and the talus is neither fractured nor dislocated.

This shelf of bone which holds up the talus and ankle may be broken off cleanly to permit the foot to drop down—that is to permit the internal malleolus to come nearer the ground. The sustentaculum may also be caught in the inversion of the foot in such a manner as to be driven into the main mass of the calcaneus—impacted.

The loss of this supporting bone edge permits the lowering of the ankle and as the foot is used for weight bearing it becomes pronated—turned on to its inner side, with resulting pain and disability.

Symptoms of Fracture of the Sustentaculum Tali—The heel region and ankle as a whole become swollen and edematous,

particularly in the inner side. When the patient comes for treatment his ankle is swollen, ankle and foot joint motions are greatly reduced, he walks on a pronated foot with a pronounced limp, and one believes at first glance that a fracture of one or both malleoli is present.

Examination of the ankle shows an intact internal malleolus if too much swelling is not present, but there is pain on pressure or manipulation of this malleolus. The majority of the pain and tenderness, however, can be shown to be just below the internal malleolus.

When the patient does not bear weight on his foot the pain disappears, but as soon as he stands it reappears on the inner side of the ankle and is vaguely referred both to heel and ankle. Roentgenogram taken in the anteroposterior plane will show the broken off and slightly separated sustentaculum in the average case. If the bone fragment is impacted into the body of the calcaneus there is much greater difficulty in making a diagnosis. Roentgenograms of both feet must be made for comparison to attempt to find whether or not the shadow of the injured calcaneus is distorted and the sustentaculum is driven into the bone.

Treatment of Sustentaculum Fracture—Under anesthesia the fragment may be pushed up in some cases to lie in contact with the body of the bone. It is held in that position by placing the foot in forced inversion, sometimes using the Thomas foot wrench. This inversion is maintained by a plaster of Paris boot extending to the knee worn from three to four weeks.

After that time the plaster is removed and the foot is baked along with light massage of the leg and ankle. Weight bearing is postponed for about twelve weeks after the injury, and later the foot is protected by wearing a metal arch support or a corrected sole on the shoe.

Full weight bearing may be delayed for as long as four months. The ultimate prognosis is good with no disability although in the early stages of convalescence there may be persistent swelling and pain after use.

FRACTURE OF THE TROCHLEAR PROCESS

Fracture of this process on the outer side of the bone results from sudden overinversion of the foot

The symptoms are the reverse of those found in sustentaculum fractures, all of the trouble lying on the external surface of the heel just below the external malleolus

The treatment is the same as that for sustentaculum fracture, except that the foot is not strongly inverted, but is held in a straight line with the leg

COMPRESSION FRACTURE

These are the ordinary fractures of the calcaneus and represent over 90 per cent of all those involving this bone

The variation in the amount of compression and cracking in the bone is wide. We make no attempt to discuss the bone pathology thoroughly, but we must acknowledge that the disability after compression fracture arises from the flattening compression of the bone which lets the foot down, lowers the malleoli toward the ground, and interferes with the foot arch, coupled with a lateral spreading out of the bone. This lateral spreading out of the calcaneus leads to a widening of the heel and pressure on tendons and other structures passing beneath the malleoli

The symptoms of compression fracture are

- 1 Pain in the heel and ankle especially on the slightest attempt to bear weight
- 2 Swelling of the heel which causes a loss of the normal hollows about the *tendo achillis* at the back of the ankle
- 3 Widening of the heel when looked at from the rear
- 4 Lowering of the malleoli toward the ground
- 5 Tenderness when the calcaneus is pressed upon

The roentgenograms in both planes show the bone pathology. One film may be taken through the heel from above downward at an angle the tube being behind the foot

Treatment of Compression Fracture—Treatment of this fracture is not completely satisfactory. The results depend almost directly on the amount of compression

Reimpaction Treatment—This was first described by Cotton. Under anesthesia the foot is placed on its side on a firm, padded surface. A large wooden mallet with a padded surface is used to compress the bone by two or three heavy strokes, to reduce the amount of lateral spreading. In addition to attention directed toward lateral spreading the change in the long arch of the foot may be corrected by remolding this arch over a blunt block edge.

The foot is then encased in a plaster-of-Paris boot, with firm pressure upward on the sole in the normal hollow of the foot while the leg is flexed on the thigh.

An attempt to narrow the fractured mass of the calcaneus may be attempted by metal calipers which are applied on either side of the heel to exert pressure inward, like an old fashioned fire tongs used to pick up pieces of coal for a grate.

An immobilization of four to six weeks in the plaster is required. The foot is then removed from the boot, baked, and massaged, but weight bearing is put off for from three to six months and is guarded as advised.

In some clinics they do not use methods to narrow the bone, but get the patient up to walk as soon as possible, the inner side of the shoe being raised 1 inch. Convalescence proceeds with considerable pain, but the end-results are fair.

Old fractures of the calcaneus with swelling and pain beneath the external malleolus and bony widening require operation to thin down the bone and keep it from pressing on the tendons beneath the malleoli—the external particularly.

THE TYPE OF FRACTURE IN THE TWO CASES REPORTED

The type of fracture in the 2 cases shown here does not fit into these usual four types.

The mechanism of these two unusual fractures of the calcaneus is probably as follows:

The patient sustains a sudden slight fall or impaction on the foot which is probably held in some inversion and with the sole cupped as in *pes cavus*. The violence is not great enough to cause compression fracture of the whole bone or fracture of the sustentaculum, but the impact brings enough force against

the sole of the foot to shorten the lateral portion of the plantar fascia and the flexor digitorum brevis the abductor digiti quinti, and quadratus plantæ of the foot on its outer side. This shortening in the muscles and fascia already under tension (as the man in the elevator who stood partly raised on his toes) caused the origin of the muscles from the outer anterior under surface of the tuber calcanei to be pulled out taking a small bone fragment along with it.

This bone fragment may lie up under the ordinary outline of the calcaneus as seen in the lateral view, it may be in profile as in Fig 297. The broken off bone fragment is pulled plantar ward and anteriorly and lies sticking down into or toward the plantar tissues.

If the bone fragment is not seen in the first roentgenogram, no fracture is diagnosed. Walking and use of the foot cause pain from pressure against this fracture fragment. The pain will continue for a long time.

To diagnose this fracture of the calcaneus there will be found

- 1 Pain and tenderness to pressure on the under outer aspect of the calcaneus near its middle

- 2 Scarcely any swelling or ecchymoses—held back by plantar fascia

- 3 Pain referred to the heel when the little toe is dorsal flexed or abducted, or when the plantar fascia on the outer side of the foot is tensed by pressure

- 4 No change in relation of malleoli at ankle

- 5 No change in hollows about heel posteriorly

- 6 Prolonged disability when weight bearing is attempted

The treatment must be freedom from weight bearing until acute pain and reaction subside. This will be six to eight weeks. If pain then recurs when shoes are worn a soft pad may be put like a bunion plaster around the tender point beneath the heel.

The ultimate prognosis is good as pain will eventually disappear.

If the fracture is not recognized and weight bearing is encouraged, the disability may extend for months.

All suspected fractures of the calcaneus should have not only anteroposterior and lateral roentgenograms, but a third film should be made with the inner side of the foot raised so that there is about a two thirds lateral view to throw into profile any bone fragments torn off from the plantar surface. By this means alone may the x ray aid us in eliminating completely all possible fracture.

CLINIC OF DR FREDERICK CHRISTOPHER

EVANSTON HOSPITAL

- I A CASE OF FECAL FISTULA ORIGINATING IN THE SIGMOID. RESECTION OF FISTULA AND ADJACENT SIGMOID. LATERAL ANASTOMOSIS RECOVERY.
- II. A CASE OF FECAL FISTULA ORIGINATING FROM A GUNSHOT WOUND OF THE RECTUM, FISTULA COMMUNICATING WITH BUTTOCK. CARREL-DAKIN TREATMENT. RECOVERY

Case I.—Mr W A McC on October 28, 1926 was admitted to the Evanston Hospital This patient had been operated upon by the writer in July, 1924 At that time he had a rounded mass, some 4 x 8 inches, in the left lower quadrant, with fever, leukocytosis, and localized rigidity At operation inflammatory omentum was removed to which was attached a portion of intestinal tissue The intestinal opening was carefully sutured and the abdomen closed with drainage The convalescence was stormy, and on the fifth day, postoperative gas and feces escaped from the wound Although the patient recovered his general health this fistula never closed The amount of fecal discharge was variable, at times being very small, but never ceasing entirely Of great interest was the pathologist's report Microscopic study of the portion of the small bowel removed caused him to pronounce it *ileum*, and it was thought at this time that the pathology was due to a ruptured Meckel's diverticulum¹⁶

This patient was 5 feet 7 inches in height and weighed 220 pounds The urine showed a small amount of albumen and a few hyaline casts In the left lower quadrant, about 3 inches from the umbilicus, was a discharging fecal fistula about $\frac{1}{8}$ inch in diameter Surrounding the orifice of the fistula for a distance

of about 1 inch was inflamed scar tissue. A probe passed vertically into the fistula entered for about 2 inches and evidently into the lumen of the bowel. The probe could also be passed horizontally upward from the orifice for a distance of 1 inch indicating a diverticulum of the fistulous tract.

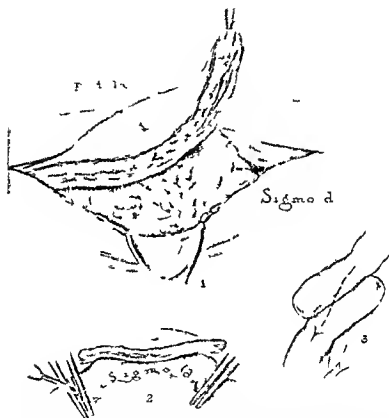


Fig 301—Showing method of repair of fecal fistula in Case I. 1 Delivery into the wound of the fistulous tract (surrounded by an island of skin fat fascia, etc.) and of the subjacent large bowel. 2 Resection en bloc of fistula and affected portion of the bowel. 3 Lateral anastomosis.

Under nitrous oxid and ether anesthesia a surgical repair of the fistula was attempted. The skin surface was carefully cleansed of feces and painted with iodin. A strong purse string

suture was then placed so as to encircle the fistula and pulled up tightly and the fistulous opening closed with collodion. The skin was again painted with iodine and a wide elliptic incision was made encircling the fistula and keeping $1\frac{1}{2}$ to 2 inches from it. This incision was extended down through fascia, muscle, and peritoneum keeping well away from the fistula (Fig. 301-1). The result of this procedure was to deliver into the wound in one block the fistula with its surrounding abdominal wall and that portion of the gut from which the fistula arose. This gut proved to be the sigmoid, and the fistula originated from a point some 10 or 12 inches above the rectum. This made it difficult to mobilize the affected part which could not be lifted out of the abdomen. The presence of adhesions and a very large amount of mesenteric and epiploic fat made the dissection and identification of the structures difficult. The sigmoid was burned through between clamps some 2 inches above and below the fistula and the fistula and adherent structures removed without contamination from the bowel or fistula (Fig. 301-2).

Pathologic Report (Dr. J. L. Williams).—Where the fistula joins the bowel the aperture is lined with a rim of skin 0.3 cm. wide. The wall of the large diverticulum consists of dense fibrous tissue and is 1.2 cm. thick.

Microscopic. Sections through the wall of the bowel reveal a marked increase in fibrous and muscular tissue and a mucous lining similar histologically to that of the large bowel. The wall of the large diverticulum contains granulation tissue with areas of necrosis and cellular infiltration with leukocytes and lymphocytes.

Diagnosis.—Fistula of the large bowel; multiple diverticula of the large bowel; chronic inflammation.

A mass of tissue 14 by 8 by 8 cm. consisting of a piece of skin and subcutaneous tissue 13 by 8 by 4.5 cm. with 5.5 cm. of large bowel adherent to its under surface as if by sutures and granulation tissue. The cutaneous surface 13 by 6.4 cm. is wrinkled and recently sutured together with interrupted black silkworm gut sutures to which there is adherent a piece of dried material 3.3 by 0.7 by 0.7 cm. resembling dried collodion. When the sutures are out there is disclosed a puckered scar 3 cm. in diameter containing a central opening 0.5 cm. in diameter which communicates with the lumen of the large bowel. The subcutaneous tissue consists of yellow lobulated fat with dense fibrous tissue about the place of attachment of the bowel. The ends of the bowel are black from recent craterization. The lining mucous membrane is slightly edematous and contains an opening 1.2 cm. in diameter filled with six small oval fecal concretions as large as 0.8 cm. in diameter. At one

side of the opening there is a small diverticulum filled with such a fecal concretion and there are multiple other small diverticula from which the other concretions may have been dislodged. When the bowel is opened there is found a larger diverticulum 3 cm in diameter communicating with the bowel by a narrow aperture 0.5 cm in diameter and lined with mucous membrane and granulation tissue.

The ends of the gut were then inverted by purse string and covered with fat. With some difficulty, owing to the awkward position, a lateral anastomosis was made (Fig 301 3). To protect the healing anastomosis from pressure a cecostomy was done by invaginating a rubber tube into the cecum and passing it through a stab wound in the right lower quadrant. The large abdominal wound was carefully closed in layers, using strong chromicized catgut for the aponeurosis. One rubber tube drain was placed at the lower angle of the wound. The patient left the operating table after three hours and a half with a pulse of 120. A lavage was done and 1800 cc of normal salt solution was given under the skin. The convalescence was very satisfactory. The profuse drainage from the cecostomy was kept from contaminating the main wound by adhesive and collodion dams. The cecostomy tube occasionally was irrigated to insure its patency. Flatus was expelled by rectum from the third day postoperative. On the sixth day bowel movements per rectum began and from then on the discharge through the cecostomy gradually became less and ceased on the fourteenth day. The patient was up and about on the sixteenth day and was discharged from the hospital on the eighteenth day with the wounds nearly entirely healed. Two weeks later he resumed his occupation as a barber and was in excellent health and spirits.

Case II—Patient E. A. aged thirty six a policeman was admitted to the Evanston Hospital on September 14 1924. Shortly before admission he had sustained a gunshot wound of the left thigh. The bullet entered below the trochanter and after passing obliquely upward made its exit from the right buttock. The patient was first seen by the writer some twenty

hours after admission. At this time blood had been passed by rectum. The x ray was negative. There was distention, vomiting and some abdominal rigidity. The white count was 16 000 and the temperature 103° F pulse 118. As there was considerable likelihood that the wound of the rectum involved the peritoneum an exploratory laparotomy was decided upon. At operation the sigmoid was found to be distended with blood but there was only a small amount of bloody fluid in the abdominal cavity and no visible peritoneal wound. The large bowel was pulled up through a left inguinal colostomy opening and the midline incision drained. Some hours later a rectal tube was inserted and on finding that feces passed easily through this tube the loop of colon on the colostomy opening was replaced in the abdomen and a drain inserted. From this time on the abdominal condition progressed satisfactorily. The wound of exit however discharged feces and gave increasing signs of inflammation. This wound was widely opened, necrotic material debrided and the Carrel Dakin treatment instituted. Feces and flatus were passed through the wound in decreasing amounts for a week and finally ceased. The rectal tube was kept in place for six days. The large wound of the buttock rapidly responded to the Carrel Dakin treatment and save for an attack of colon bacillus pyelitis convalescence was uneventful and the patient was discharged from the hospital on November 5, 1924, forty six days after admission. The patient subsequently developed ventral hernie of the operative wounds. These were successfully repaired in January, 1926.

DISCUSSION

Fecal fistula has been defined as an abdominal fistula communicating with the intestine and allowing the escape of fecal matter.¹ If all the intestinal contents escape through the opening the communication is spoken of as an artificial anus and is the result of a voluntary procedure on the surgeon's part. The majority of fecal fistula are accidental, a small portion are intentional. To be a true fecal fistula the character of the discharge must be fecal, that is, it must be dark colored from the pig-

ments, semisolid, and have the characteristic odor. Fistulæ originating from stomach and duodenum are not fecal fistulæ.

The prevention and the treatment of fecal fistula deserve the most serious attention of surgeons, for, while the mortality of this condition is low, there is nothing more repulsive and disheartening to the patient.

Lockhart Mummery² classifies fecal fistulæ as follows

- 1 Temporary colostomies with (or without—F C) spurs
- 2 Cases in which mucous membrane is adherent to the skin
- 3 Cases in which a fibrous tract or sinus connects the gut with the skin opening
- 4 Cases where the gut opens into an abscess cavity connecting with the surface

5 Cases of fecal fistula complicated by compound fracture and hemorrhage

Moynihan³ classifies openings between the skin surface and the intestine into three types

1 A small opening upon the skin which leads by a direct or tortuous path to an opening in the bowel (Fig 302, 1)

2 A larger opening in the intestine which has an edge formed by the direct continuation of the mucosa with the skin (Fig 302, 2)

3 The intestine, as it comes to the surface opening has two limbs which join at an acute angle and has a well marked spur (Fig 302, 3)

The causes of fecal fistula are numerous and include the following

1 *Trauma*—(a) Penetrating or gunshot wounds. The fistulæ caused by gunshot wounds are generally through the abdominal wall, but wounds in the rectum and sigmoid may cause fistulæ through the buttocks. The writer's second case is illustrative of this type. Nesselrode⁵ reports a gunshot wound of the rectum with a resulting fecal fistula in both hips. This case was cured by an inguinal colostomy. Taylor³³ gives an interesting record of gunshot cases.

(b) External violence. In this connection the interesting case of Morris Smith⁴ deserves mention. Five weeks after

being struck across the abdomen Smith's patient developed an abscess and fecal fistula originating from the colon. At operation six weeks later the bowel was found to have been completely divided, except for an area of mesenteric attachment. In this case adhesions evidently protected the extensive damage to the bowel.

2. *Operations*.—MacLaren⁶ found 77 cases of fecal fistula in a study of 5000 major operations, with 15 deaths, or a mortality of 19 per cent. The operations in these 77 cases were Appendiceal abscess, 24, ovarian abscess, 22, due to tuberculosis, 16; injuries to intestine, including intussusception, 8, carcinoma of

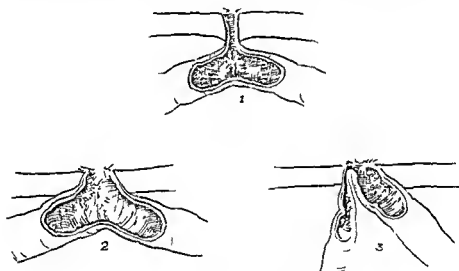


Fig 302 —Types of fecal fistulæ (Moynihan)

the colon, 3, tubal abscess, 2, drainage of gall-bladder, 1; perineal prostatectomy, 1. Eighty per cent of these fistulæ closed spontaneously.

The incidence of fecal fistula following operations for appendicitis is variable. Muhsam⁷ in 1903 analyzed 1256 operations for appendicitis in Sonnenburg's practice. In the first 441 cases there were 78 fecal fistulæ or an incidence of 16.3 per cent, while in the last 815 cases there were but 54 fecal fistulæ or 6.6 per cent. This increase is partly due to greater skill and partly to earlier diagnosis. Gibson,⁹ in 1583 ward

cases of acute appendicitis found but 19 fecal fistula or 12 per cent

3 *Hernia*—Haggard¹⁰ reported 5 cases of spontaneous fecal fistulæ following strangulated hernia. In Taylor's¹¹ case there was a fecal fistula of the scrotum from an inguinal hernia.

4 *Benign and Malignant Ulceration*—Foreign bodies in instrumentation benign and malignant ulceration have been the cause of fecal fistulæ. It may be congenital as in cases of patent omphalomesenteric duct.

The diagnosis of fecal fistula offers no trouble but the type and course of the fistula may be difficult to ascertain. It is desirable if possible to know the exact part of the bowel in which the fistulæ originate. Injection of the fistula or the colon with a bismuth petrolatum paste and subsequent x ray examination as advised by Carman¹² will give the required information. Judd¹³ has made a valuable suggestion in the occasional instances where it may be doubtful whether or not a suppurating sinus following an abdominal operation has any connection with the bowel. The sinus is thoroughly injected with opaque paste the external opening is sealed with gauze and adhesive plaster and a roentgenogram made. A second roentgenogram is taken twenty four hours later after purging the patient with oil. If the second plate indicates a diminution of the paste as shown by changes in the sinus shadow it is safe to assume that a fistulous connection with the bowel exists otherwise not.

Many fistulæ close spontaneously and it is well to give the case time to see if this will occur. The time to interfere is a question of judgment but when progress toward closure has ceased for thirty to sixty days operation is to be considered. However Gage (quoted by Kelly¹⁵) reports a case which ran seven years and then recovered. Henneck²² reported a case of intestinal fistula following a gall bladder operation where tape worm segments were expelled through the fistula.

In a discussion of the treatment of fecal fistula prophylaxis is of importance. There can be no question that skill and judgment in operating will reduce the incidence of fecal fistula.

Careful handling of the tissues and prudence in not pushing the operation too far are of importance. All agree in the avoidance of rigid drainage material and cautious removal of any drainage material. Guthrie¹⁴ believes the McBurney to be the incision of choice in suppurative appendicitis and advocates two purse-strings of catgut, believing non-absorbable sutures inadvisable in the presence of infection. He advises the cuff operation where inversion is impossible. Gibson⁹ stresses leaving the appendix wound largely open and draining by the rubber dam Mikulicz tampon. Removal of the appendix is advisable if at all possible.

When the appendix is simply ligated and amputated in an abscess, formalin or chromicized catgut ought to be used.¹⁵ Patients in danger of acquiring a fistula should receive only a minimal amount of food and live as much as possible on albumen water.¹⁵ The surgeon should restrain himself in the administration of cathartics. In bad appendicitis cases it is generally inadvisable to give a laxative for ten to fourteen days. A small enema may be given with caution after five days.

The symptomatic treatment of fecal fistula includes measures directed at preventing excoriation of the skin from the irritating fecal discharge. After thorough cleansing with soap, water, and alcohol, zinc oxid ointment or vaselin is very efficacious. Ochsner¹⁷ recommended applications of egg albumin to the affected skin surface.

The surgeon should see to it that the patient is carefully fitted with a well-made colostomy bag and should instruct the patient in the toilet of this bag. The writer feels that it is important to shun coarse articles of food, such as bran, large seeds, etc., as these objects may become lodged in the fistula and cause abscesses or inflammatory diverticula. The diet in fistula cases should be such as to leave a coarse residue, as the bulky feces is less liable to escape through the fistula than the fluid.

Various non-operative procedures have been attempted in an effort to cure the fistula. Fecher¹⁸ praises Stadtler's plan for closing intestinal fistulæ by tamponade: "a cotton tampon is soaked in olive oil, a corner of the tampon is inserted, plugging

the fistula as tightly as possible, and held in place by a snug and firm bandage, the plug is left in place at least twelve hours and longer if possible—up to two or three days. As the oil does not mix with the intestinal juices there is no capillary drainage, and the passage to the exterior is hermetically sealed. Frequently renewed these plugs often close the fistulæ no matter whether tubular or not. Even if the tract does not heal definitely the cutaneous lesions from constant escape of digestive fluids heal and facilitate operative measures otherwise impossible by the state of the skin. Used on 13 occasions closure was effected in twelve to fifty days (duodenal 2, in small bowel, 5 large, 6) " Mere pressure on the fistulous opening by a gauze pad is thought to be useful.¹⁹

Leonard Freeman²⁰ says that occasionally long and narrow fecal fistulæ may be obliterated by the subnitrate of bismuth paste recommended by Emil Beck. For this the postoperative ones are more favorable than those due to tuberculosis. The procedure is not effective, however, in large or short fistulæ, and should not be employed until the tract becomes chronic and its walls sufficiently strong to avoid the danger of bursting.²⁰

Professor Soubotitch of Belgrade²¹ applies tincture of cantharides to the fistulous tract. Cauterization by the actual cautery or by silver nitrate may destroy any mucosa in the fistulous tract and tend to stimulate healing.

In cases of postoperative fistula of doubtful etiology, Kelly¹⁵ advises the exploration of the fistulous tract with a small crochet hook to see if there be a ligature at the bottom which may be drawn out. The same writer finds hydrotherapy of great comfort to the patient.

There is no one best operative method applying to all types of fistulæ. The methods vary with the type of the fistula. Generally speaking all operations for fecal fistula may be classified as either extraperitoneal or intraperitoneal and may be considered under these two heads.

To Coffey²² goes the credit of devising an extraperitoneal closure of fecal fistulæ which is based on the principle of converting a direct to an indirect sinus, and the phenomenon that

the planes of a sutured infected wound will drain through tubes or other drainage material placed at the angles of the wound

Coffey's description of the operation follows

1 Dissect out the old scar down to the fat and make an incision around the fistulous tract, including a small strip of skin, direct the front of the knife slightly away from the fistula, so that it first comes in contact with the fascia about $\frac{1}{2}$ inch away from the fistula in order to avoid any possibility of opening the peritoneum

2 Dissect up the fat from the fascia for as much as 2 inches from the incision, draw it back clear of the fascia

3 Make an incision through the fascia beginning at the upper end of the wound and coming toward the fistula. Dissect the fascia from the muscle for at least 2 inches in every direction

4 Dissect the muscle from the peritoneum in the same manner, so that the peritoneum hangs loosely with the fistula standing up in the center like a volcano and its crater

5 The little margin of skin which has been left with the edge of the fistula is now trimmed off

6 If the wall of the fistula is hard and cicatricial making it difficult to turn in it is well to make an incision part of the way through the cicatricial tissue so that it may be turned in easily

7 The edges of the fistula are turned in with linen sutures which are knotted on the inside

8 A second layer of sutures brings the edges of this incision and the connective tissue covering the peritoneum along with the scar tissue covering the turned in fistula to add temporary strength and bulk to the closure. The peritoneum and the rest of the wound is now thoroughly mopped or irrigated with salt solution to make it as clean as possible

9 Silkworm gut sutures are passed through the skin, fat, fascia and muscle about $\frac{1}{4}$ inch or more from the wound edge and left untied space being left at both ends of the wound for drainage

10 Suture the muscle loosely with a continuous catgut suture

11 Suture the aponeurosis with a strong double chromic catgut suture

12 Suture the skin with horsehair

13 Place drainage tubes in position

14 Tie silk worm gut stay sutures

This method is very successful for the large and small intestines. It is located at a point where the layers of the abdomen may be dissected entirely apart and there is no obstruction below. If feces and gas escape from the drainage wounds it shows that a good indirect sinus has formed which will heal in due time.

In this connection Beck³⁴ remarks that when the bowel is sutured and kept far below the fascia so that it cannot adhere to the skin a fistula will usually close by secondary union.

David⁴ makes a closure by making a wide mobilization of the bowel wall extraperitoneally. When the bowel is well separated from the skin and fascia down to the peritoneum a typical bowel closure with a three layer stitch is done. This bowel is then pushed below the fascia which is closed by sutures tied over buttons. The skin is either left open or at best one or two interrupted stitches are placed.

Bier⁷ believes the underlying principle to be the separation of the suture line from the skin by a layer of healthy adipose tissue.

In some fecal fistulae a spur or projection into the fistula of the opposite gut wall makes closure difficult or demands resection. However in some cases it is possible to destroy the spur and convert the fistula into one of a simpler class which may be closed by pruning the edges and suturing. Sir Mitchell Banks introduced a piece of thick rubber tubing into the bowel so that one end went into the upper end and the other into the lower end of the bowel. The tube was secured by a long silk thread and being elastic tended to straighten itself and by pressure obliterate the spur. Another method of destroying the spur is by grasping it between the roughly serrated blades of an enterotome and daily tightening the grip until the spur is destroyed and the lumen is again made patent. For this pur-

pose the fenestrated steel valve clamp of Gant²⁶ is probably preferable to an enterotome

The chief principle in the intraperitoneal method is to try to avoid entering or getting contamination from the fistulous tract. In the words of W. J. Mayo²⁸ 'it is a simple matter to circumscribe a fecal fistula by an incision down to the peritoneum at some point outside of the intestinal adhesions and introduce the finger as a guide. The less firm adhesions are swept loose and the circumscribing incision deepened through into the peritoneal cavity. The intestinal loop containing the fistula can be drawn out upon the surface of the abdomen surrounded with gauze, and the fistula closed in the long axis of the intestine by two rows of sutures, the outer row preferably of interrupted linen or silk.'

As a preliminary step to all peritoneal operations the fistula should be tightly closed by a purse string and sealed, if possible, with collodion.

After the bowel and adherent fistulous tract have been delivered *en bloc* the local excision as described above may be practical, or a resection of the bowel with complete removal of the section containing the fistula may be necessary.

Lockhart Mummery² emphasizes that in resection cases the bowel should always be cut so that more of the bowel wall is cut away at the free side than at the mesenteric side—even healthy bowel being removed if necessary. The cut edges of the bowel which are going to be joined together should form roughly an angle of 45 degrees with the mesenteric border. This makes certain that the stitches joining the ends of the bowel on the mesenteric side do not cut off the blood supply to the joined edges on the free side.

Lateral anastomosis is generally preferable. However, in resections of the sigmoid Balfour²⁹ has been very successful, doing an end to end anastomosis over a rubber tube. Deaver⁸ occasionally does an ileocolostomy after closing the fistula. Crile³⁰ makes a lateral anastomosis without removing the isolated coil of intestine which eventually shrinks. He is careful that his drainage in cases of this type is placed away from the field of

operation R T Morris³¹ in praising the cigarette drain warns against carrying it too closely to the bowel wall

Deaver³ analyzed 200 cases of fecal fistula following acute appendicitis cases 37 per cent of these healed spontaneously 48.5 per cent required operative repair 14.5 per cent left the hospital refusing operation Of the 97 cases operated upon 80 recovered 8 recurred and 9 died In 60 per cent of the cases simple inversion of the fistulous opening by a purse string of linen suture reinforced by an additional suture line was all the surgery required In 15 per cent an ileocolostomy was done after inversion and reinforcement of the fistula Twenty three per cent required resection of the bowel Haggard¹⁰ reported 5 cases of spontaneous fecal fistula following strangulated hernia Two of these cases healed spontaneously Two healed after freshening the margins of the opening and one healed after abdominal section and detachment of the loop Gibson⁹ reports 19 cases of fecal fistula 17 (88 per cent) healed spontaneously and 2 cases (12 per cent) required operation (1 simple inversion and 1 suture of small hole in ileum) Watson³⁵ points out that if an artificial anus is made high up in the small intestine resection is almost imperative or the patient will soon die of inanition Muhsam³⁶ analyzed 49 cases of fecal fistula following appendicitis 38 (62 per cent) healed spontaneously or were decidedly improved 8 recovered after operation and 12 died 3 of the deaths being among patients operated upon Deaver³ reports 222 cases of fecal fistula among 4655 cases of acute appendicitis Of these 222 fistulas 86 (39 per cent) healed spontaneously while 108 (49 per cent) required operative repair The remainder 30 (13.5 per cent) refused operation most of them probably closed spontaneously In 53.5 per cent of the operative cases simple inversion of the fistulous opening by a purse string suture followed by reinforcement by an additional suture line was the only procedure required In 15 per cent ileocolostomy was done in addition to the inversion procedure In 23 per cent resection of the bowel was done with ileocolostomy as the last stage of the operation Of the 108 operated cases 89 were discharged from the hospital perfectly healed 10 recurred

BIBLIOGRAPHY

- 1 Cattell, H W Lippincott's Med Dict 2d (1911) ed pp 343
- 2 Lockhart Mummery Surg Gynec., and Obst 29 312 September 1919
- 3 Movnihan, Sir Berkeley Abdominal Operations W B Saunders Co 1926, vol II, p 170
- 4 Smith, M K Amer Jour Surg 40 91 Ap 1926
- 5 Nesselrode, C C Surg Clin of Chicago 3 805 August 1919
- 6 MacLaren, A Journal Lancet 38 185 April 1918
- 7 Muhsam, E Mitt a d Grenzgeb der Med u Chir 1903 Bd 11 28 (quoted by Kelly)
- 8 Deaver, J B Surg Clin N America 5, 1474 December 1925
- 9 Gib-on, C L, and Sherrill W P Amer Jour Surg 40 7 January 1926
- 10 Haggard W D Amer Surg, 68 272 September 1918
- 11 Taylor, W F O Brit Med Jour 2 60 July 11 1925
- 12 Carman, R D The Roentgen Diagnosis of Diseases of the Alimentary Canal W B Saunders Co, 1917, p 534
- 13 Judd E S Quoted by Carman
- 14 Guthrie Amer Surg, 63, 452 April 1916
- 15 Kelly, H A, and Hurdon, E The Vermiform Appendix W B Saunders Co, 1905, pp 676 677
- 16 Christopher, Frederick International Clinics March 1925 p 67
- 17 Ochsner, A J Surg Clin Chicago 3 699 June 1919
- 18 Fecher, K Quoted by Evarts Graham Practical Medicine Series Gen Surg, 1926 p 378, Med Klinik June 12 1925
- 19 Da Costa J C Modern Surgery 7th ed p 993
- 20 Freeman Leonard Keen's Surgery, vol VI p 44
- 21 Soubbotitch Quoted by Gibson p 44
- 22 Coffey, R. C. Annals of Surg, 1907 45 827 quoted by Movnihan
- 23 Coffey, R. C. Journal Lancet, 39 633 December 1 1919
- 24 David Vernon Personal communication
- 25 Banks, Sir Mitchell Quoted by Movnihan p 16
- 26 Gant, S G Diseases of the Rectum Anu and Colon W B Saunders Co, 1923, vol III, p 435
- 27 Bier Quoted by Gant
- 28 Mayo, W J Annals of Surg., July 1909
- 29 Balfour, D C Surg Gynec., and Obst 1920 (Collected Papers of Mayo Clinic, 11, 154)
- 30 Crile, G W Cleveland Med Jour 15 507 August 1916
- 31 Morris R. T In discussion of Gib-on's paper
- 32 Henneck, A P Ill Med Jour 43 245 March 1925
- 33 Taylor, J Practitioner 100 487 June 1918
- 34 Beck, C. and Cabot, U S Surg Clin N America 1 1227 August 1907
- 35 Watson, L F Hernia C V Mosby Co 1924 p 50
- 36 Muhsam Quoted by Kelly Mitt a d Grenzgeb der Med u Chir 900 Bd 5 p 111
- 37 Deaver J B Amer Surg, 83 752 June 1926

CLINIC OF DR. SUMNER L. KOCH

WESLEY MEMORIAL AND COOK COUNTY HOSPITALS

THE TREATMENT OF CONTRACTURES WITH THE AID OF FREE FULL THICKNESS SKIN-GRAFTS AND PEDUNCULATED FLAPS*

To secure a covering of normal tissue over the area involved in a contracture is frequently the essential requisite for successful treatment. Subcutaneous scar tissue may be excised, fibrous adhesions may be divided and the ends widely separated by extension of the affected part, even contracted tendons may at times be divided without serious loss of function, but unless a covering of normal skin can be secured to replace the defect left by excision of scar tissue recurrence of the contracture is almost inevitable. When one considers that the majority of contractures are due primarily to loss of superficial tissues, and that the involvement of the deeper structures often results from infection and from the scar tissue contraction that is so important a factor in the healing of the superficial defect, rather than from primary loss of the deep tissues, the importance of restoration of the covering tissues is obvious. Even when the contracture is due to a primary involvement of subcutaneous tissues, as in Dupuytren's contracture of the palmar fascia, removal of the primary cause may not prevent a recurrence unless such removal is supplemented by the transplantation of skin to compensate for the associated defect of the covering tissues.

Two methods may be used to secure a covering of normal tissue over the raw surfaces left by excision of scar tissue: the transplantation of free full thickness grafts of skin, and the

*From the Department of Surgery, Northwestern University Medical School

transfer of skin and subcutaneous tissue by the aid of pedunculated flaps. Both methods have advantages and disadvantages. Both require an exacting technic. Under certain conditions the combined use of the two methods has distinct advantages (Fig 303).

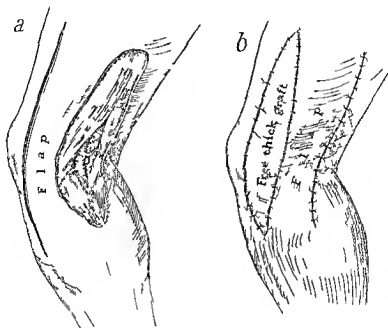


Fig 303—Technic of operation for a contracture involving the knee. *a* The popliteal vessels and the dividing sciatic nerve were laid bare in the excision of scar tissue. *b* A flap with a double pedicle from the anteromedial aspect of the limb was shifted posteriorly to cover the raw surface. The resulting defect was immediately covered with a free full thickness graft from the abdomen.

There are many advantages in the use of the free full thickness graft. First the entire operation is completed in one stage. Second there are no uncovered surfaces exposed to postoperative infection from the adjacent skin since the raw surface is prepared at the primary operation the graft is raised immediately and sutured in place. Third the postoperative care is very simple and unless infection develops postoperative dress

ings are reduced to a minimum. The disadvantages in the use of the free graft are that it is difficult to transfer fat and subcutaneous tissue with the graft without danger of losing the graft and that unless the bed of the graft is sterile and well supplied with blood vessels necrosis may easily take place.

There are two distinct advantages in the use of the pedunculated flap. First it is possible by this method to transfer subcutaneous tissue as well as skin. If bare tendons, bones or joints or if important nerves or blood vessels are exposed in the depth of the wound such a covering is essential. Second a slight infection will not cause loss of the graft. The disadvantages of the pedunculated flap are that several operations are required except in the case of a sliding flap, tedious immobilization may be necessary and the danger of contamination of the raw under surface of the pedicle from the adjacent moist skin is a constant even if a slight hazard.

FREE FULL THICKNESS GRAFTS

The technic of application of the free full thickness graft (Figs 304-305) has been carefully worked out experimentally by Neuhof¹ and clinically by Davis,^{*} Blair,² Padgett,⁴ Smith,⁵ McWilliams,⁶ and others. The essential considerations are that the raw surface to be covered should be freshly made by resection of healed scar tissue or shifting of normal tissue*, in other words it should be a clean surface, it should be dry and it should possess an adequate blood supply. The graft should be of the exact size and shape as the defect. It should consist of the entire thickness of the skin without subcutaneous fat. It should be sutured accurately in place so that there is edge to edge apposition of the graft and the surrounding skin edge. When the suture is completed the graft should be under slight tension. If it is relaxed a strip must be excised or the graft made taut by additional sutures which catch the skin outside the line of suture (Fig. 304 c). After it is sutured in place the graft should be perforated in a number of places with a sharp-

* Davis and McWilliams believe that the free full thickness graft can also be successfully used on clean granulating surfaces.

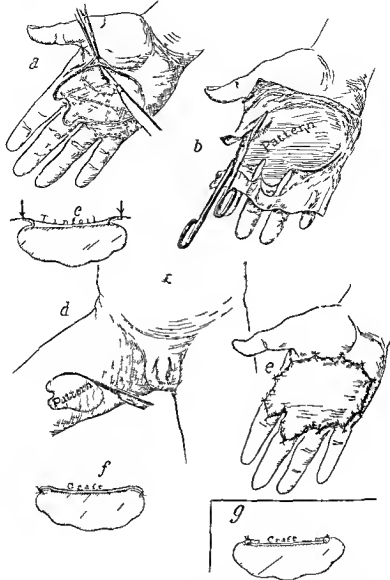


Fig. 304.—The technic of application of the full thickness graft. *a* The edge of the raw surface is undermined so that an accurate suture in ectropion may be secured. *b* An exact pattern of the defect is made from tinfoil or waxed paper. *c* If the patient is a child the undermined edge of the raw surface is laid back and the pattern cut in accordance with the enlarged raw surface (Blair). *d* The inner side of the thigh is the site of choice for securing a graft free from hair. *e* *f* The graft is accurately sutured in place. Additional sutures which catch the skin outside the line of suture help to maintain tension on the graft (Blair). *g* The edges of the graft may be sutured underneath the undermined skin edge to allow for retraction and subsequent growth (Davis and Traut).

pointed knife, so that when pressure is applied any accumulation of serum will be expressed from underneath the graft. It should be covered with a pressure dressing, such as may be secured



Fig 305 —Maintenance of tension while the graft is being raised helps one to secure a graft free from subcutaneous fat. With tissue forceps on the edge of the graft and counter-tension on the raw surface from which it is being raised an assistant can greatly facilitate the operation.



Fig 306 —Contracture following a burn sustained while sliding down a rope. Left, limit of extension before operation. Right, appearance three weeks after the application of a free thick graft, immediately after removal of the pressure dressing.

with marine sponges, which have been carefully washed, rinsed in sterile water, and wrung dry. The pressure should be maintained for three weeks after the application of the graft, by which time healing should be complete.

In applying a free full thickness graft several minor details are worthy of mention. A transparent substance such as sterile waxed paper is of advantage in making the pattern of the raw surface. Sterilized crinoline may be advantageously used when the base of the raw surface is uneven. By following the edge of the pattern with the point of a sharp knife the outline of the graft may be easily scratched on the skin. While this is being done the skin should not be stretched taut but allowed to lie at its normal tension. If it is stretched taut the graft will be smaller than the defect.

The graft is usually taken from the abdomen or the inner surface of the thigh. If the patient is a child respiratory movements of the abdomen may add a little to the difficulty of

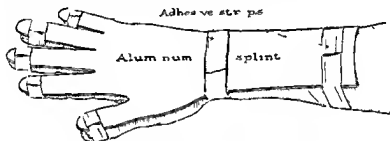


Fig. 30 Extension of contracted fingers maintained with the aid of a light aluminum splint

raising the graft but if the graft is of appreciable size approximation of the skin edges after removal of the graft is less difficult on the abdomen than on the thigh.

If the graft is held under tension as it is raised (Fig. 305) it is possible constantly to keep in view the white under surface of the skin. With the aid of a sharp scalpel one may avoid removing subcutaneous fat with the graft. When one edge of the graft has been raised it is sometimes of advantage to roll it about a sterile glass rod or similar instrument and thus to hold it taut while an assistant lays a flat retractor upon the exposed raw surface and maintains countertension.

In suturing the graft in place a number of interrupted sutures of horsehair are first inserted at the angles of the wound and

then a continuous horsehair suture about the entire circumference. If the graft is to be applied to the hand of a growing child, it is wise to allow for subsequent growth of the hand and apply a graft larger than the defect by the method suggested by Blair (Fig. 304, *e, f*), or that suggested by Davis and Traut⁷ (Fig. 304, *g*).

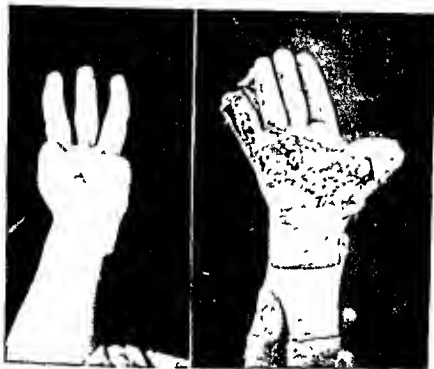


Fig. 308—Contraction of the hand following a burn. Left, before operation. The thumb and fifth finger are tightly approximated by scar tissue. Right, three weeks after operation. Some necrosis of the graft has occurred in the center of the palm and the hand is being treated by daily applications of a wet boric dressing over which sponge pressure is maintained.

In dressing the wound a layer of xeroform gauze (gauze saturated with vaselin containing 3 per cent bismuth tribromophenolate) is laid over the graft, over the xeroform gauze are laid several layers of dry gauze, and over these the marine sponges. Instead of sponges Smith⁵ uses rubber bags inflated with air under a pressure equivalent to 40 mm. of mercury. If the graft is applied to the palm of the hand, a light, well-

padded aluminum splint (Fig 307) is prepared before operation so that the fingers may be bandaged or strapped in extension before the pressure dressing is applied

The primary dressing is removed in nine days. If superficial necrosis of the graft has occurred 1 per cent silver nitrate is applied and the xeroform gauze and pressure reapplied. If infection has developed several layers of gauze saturated with



Fig 309.—Technic of repair of a burn contracture of the axilla. A After excision of scar tissue. B Method of securing normal tissue to cover the depth of the axilla. The remaining raw surface was successfully covered with Thiersch grafts. (Reproduced by permission from Surg. Cyn. and Obst.)

boric solution are applied directly over the graft and the sponge pressure reapplied over the wet boric dressing (Fig 308). Such a dressing is reapplied daily until healing is complete. The presence of infection though it delays healing should not entail a loss of the graft. The necrosis of small islands of tissue is compensated for rather rapidly by the ingrowth of tissue from the healthy portions of the graft.



Fig. 310—Burn contracture of the left axilla treated by the use of a sliding flap from the chest wall. Left Before operation. Right Result three weeks after operation.

PEDUNCULATED FLAPS

The pedunculated flap has been utilized by many surgeons and in a number of different ways in the treatment of contractures. Flaps from the forehead, scalp, chest and even from the back (Alden³) have been used to cover defects about the face and neck. Flaps from the chest and abdomen have been shifted to compensate for the loss of superficial tissues about the axilla. Raw surfaces about the thigh and knee have been covered by flaps shifted from adjacent surfaces. Raw surfaces below the elbow or below the knee have usually been covered with flaps taken at a distance of 10 cm. from the abdomen, lumbar region or from the opposite extremity since the amount of normal covering available in the extremities is not sufficient to permit the shifting of tissue. In our experience pedunculated flaps have been used most frequently in the treatment of contractures about the axilla (Figs. 309-310) and contractures involving the forearm and hand.

The lateral or upward displacement of normal tissue to cover an adjacent raw surface requires little comment. The principles of this type of operation are well described in every

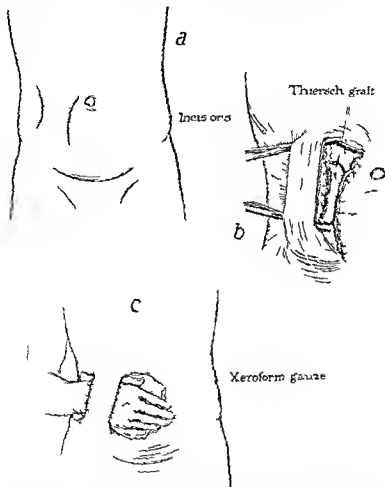


Fig. 11.—The double pedunculated flap for covering a defect of the dorsum of the hand. *a* Incisions. *b* Method of covering the raw surface underneath the flap. *c* Suture of the raw edges of the flap to the corresponding raw edges of the defect.

text book of surgery. One can hardly overemphasize how ever the importance of due regard for the blood supply and nerve supply of the displaced tissue. the importance of careful hemo-

stasis, and of freedom from tension on lines of suture. Frequently the use of a free full thickness graft or of a Thiersch graft to cover a portion of the raw surface left by displacing a flap will obviate the temptation to cover the raw surface by drawing adjacent tissues together under tension, a procedure that invariably leads to necrosis of tissue and subsequent delay in healing. The importance of covering all raw surfaces at the primary operation and so reducing the danger of wound infection to a minimum is self evident. The maintenance after operation of elastic pressure over a displaced flap has the same logical basis as the maintenance of pressure over a free graft.

When a pedunculated flap is used to cover a wound at a distance for example, when a flap from the abdomen is applied to the dorsum of the hand (Figs 311-312) a number of additional factors must be taken into consideration if one is to secure satisfactory results. An adequate blood supply, freedom from tension, and prevention of infection are primary considerations. Covering immediately the raw surface left by raising the flap lessens the incidence of infection and shortens the duration of treatment. Securing a flap that resembles in texture, color, thickness and freedom from hair the tissue it is intended to replace adds to the successful cosmetic effect and the satisfaction of the patient. Wide separation of the fingers from one another underneath the flap if the defect extends distally upon the fingers, permits the transfer of sufficient tissue to reconstruct the finger web. Consideration for the patient's comfort during the period of forced immobilization secured by determining before operation the position of greatest relaxation of the affected limb and indicating the position with lines of brilliant green at the site of the flap simplifies nursing care, and helps to obviate the development of stiff and painful joints as a result of prolonged immobilization in an unaccustomed position.

Safeguarding the blood supply of the flap is accomplished by due regard for the position and direction of the blood vessels and by using a flap with a double pedicle whenever possible. Freedom from tension may be secured by raising a flap which is one third larger than the defect it is intended to replace and

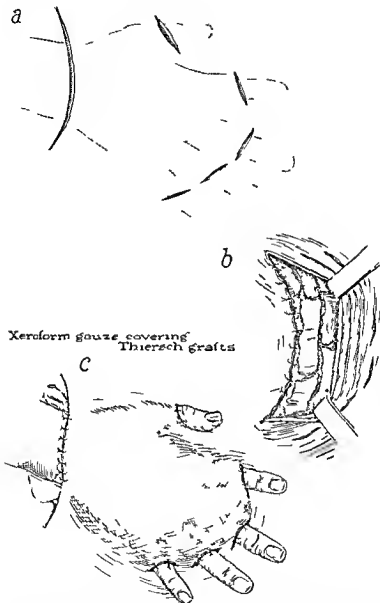


Fig 312—The pocket flap for covering a defect involving the fingers
a The site of the various incisions must be carefully planned before operation. The fingers should be widely abducted from one another so that there may be sufficient tissue available for reconstruction of the web. *b* The raw

by elevating the pedicles for some little distance from the line of suture. Making the pedicles broader than the flap itself tends to increase rather than diminish tension, but helps to safeguard the blood-supply and vitality of the flap.

When the flap has been outlined and elevated the raw surface underneath it should be covered as completely as possible (Figs 311, 312). If the flap is not too large the tissues from the sides may be approximated underneath the flap. If they cannot be brought together without undue tension, they should be made to cover the raw surface as completely as possible, and the



Fig 313 —Burn contracture of long standing relieved by the use of a pocket flap. Left, Limit of extension before operation. Right, Result six months after operation.

remaining defect should be covered with Thiersch grafts. This must be done and the dressings over the line of suture or over the Thiersch grafts applied before the hand is brought under the flap.

If the palmar surface of the hand and fingers has been involved in a contracture, one may have difficulty in keeping the fingers in extension, even after complete excision of scar tissue, because of the shortening of the muscles and tendons which has taken place. In such an event the application of a thin sterile aluminum splint to the dorsum of the hand (Fig 307) before

the hand is placed underneath the flap will enable one to keep the fingers extended and permit the flap to lie smoothly over the raw surface. Occasionally sponge pressure over the flap will form a satisfactory substitute for the dorsal splint.

Careful suture of the free edges of the flap to the corresponding edges of the raw surface on the hand and protection of the uncovered under surface of the pedicles with xeroform vaselin gauze are important details in preventing accession of bacteria to the wound. The latter step is of particular importance when the hand and fingers have been placed under a pocket flap because of the width of the pedicles and the extent of the raw area exposed.

To ensure a successful cosmetic result one should try to secure a flap that imitates the tissue it is intended to replace. To imitate perfectly color texture and freedom from hair is not always possible but it is usually possible to secure a flap with the thickness of subcutaneous tissue normally present over the area to be covered. In a desire to avoid injuring its blood supply one is often inclined to leave too much fat attached to the flap and so produce an unsightly deformity. If a part of the subcutaneous fat is cut away from that part of the flap which is actually to be transplanted and all of the subcutaneous fat is left attached to the pedicles there will ordinarily be no interference with the vitality of the flap. Undue tension is much more often a cause of necrosis of a portion of the flap than excessive removal of subcutaneous tissue.

When the suture is completed and sterile dressings have been applied the parts must be immobilized so that no displacement may occur and cause tension on the flap. A light plaster of Paris cast that does not include the flap itself furnishes more certain immobilization than bandages or adhesive tape.

The flap should be separated from its original site in several stages. Ordinarily one can begin division of the pedicles at the end of ten days and by cutting one third or one fourth of the pedicles on the tenth twelfth fourteenth and sixteenth days free the flap completely in less than three weeks from the time

of operation. Division of the pedicle is practically always done under local anesthesia and with the same attention to asepsis as the primary operation.

When the flap has been completely detached the raw edges may with advantage be treated with Dakin's solution for a few days before the excess of tissue is excised and the final suture completed. No matter how clean the raw edges may be this final step is carried out with all the care of a debridement of a contaminated wound so as to secure if possible healing by primary union of the final lines of suture.

The final result with reference to the contracture cannot be judged by the immediate postoperative result. A certain degree of deformity may persist for some time because of the contracture of the deeper tissues still present. The important and interesting fact is that if the superficial tissues have been restored to normal by the complete excision of the covering scar and the substitution of normal skin the restoration of function thus made possible incomplete though it may be and the movements of the affected parts incident to restored function are important elements in bringing about a constantly increasing improvement.

SUMMARY

Substitution of a normal covering for superficial scar tissue is frequently the essential factor in the successful treatment of contractures. This may be secured by the use of free full thickness grafts or of pedunculated flaps. The former method is adequate if subcutaneous tissue remains in the floor of the wound after excision of scar tissue. The pedunculated flap shifted from an adjacent area or taken at a distance permits the transfer of subcutaneous tissue with the skin. Either method or a combination of the two if applied under suitable conditions and with careful technic offers a definite possibility of relief of the contracture and restoration of function.

BIBLIOGRAPHY

1. Neuhof H. *The Transplantation of Tissues*. New York, 1923.
2. Davis J. S. *The Use of Free Grafts of Full Thickness Skin for the Relief of Contractures*. *Surg. Gynec. and Obst.* 1917, xvi, 1.

- 3 Blair, V P The Full Thickness Graft, Ann Surg , 1924, lxx, 298
- 4 Padgett, Earl C Quoted by Blair, loc cit
- 5 Smith, F A Rational Management of Skin Grafts, Surg , Gynec , and Obst , 1926, xlii 556 Pressure Bags for Skin Grafting, Surg , Gynec , and Obst , 1926, xlii, 99
- 6 McWilliams C A Free Full Thickness Skin Grafts, Ann Surg , 1926, lxxiv, 237
- 7 Davis, J S , and Traut H F A Method of Gaining Greater Relaxation with Whole Thickness Skin Grafts Surg Gynec , and Obst , 1926, xlii 710
- 8 Alden, B F Tubed Pedicle and Whole Skin Pedicle Flaps in a Case of Plastic Surgery of the Face Neck, and Chest, Surg , Gynec , and Obst , 1925 xli 493

CLINIC OF DR LOYAL DAVIS

WESLEY MEMORIAL HOSPITAL

THE POSTOPERATIVE COMPLICATIONS OF TRIGEMINAL RHIZOTOMY

MANY experimental and clinical studies have been carried on in an attempt to explain the etiology and pathogenesis of trigeminal neuralgia. These have consistently failed to furnish information which might make clear this interesting disease, first described in 1773 by the elder Fothergill in his monograph on *A Painful Affection of the Face*. It is interesting to know that during a rather extensive London practice Fothergill saw 14 cases of trigeminal neuralgia, and because of the persistent and incurable pain attributed the etiology to carcinoma. As a matter of fact, we today are not much closer to the truth, although some with a show of assurance believe the disease is due to an involvement of the sympathetic nervous system.

From 1886, when Sir Victor Horsley first sectioned the sensory root of the fifth cranial nerve until the present day the most fruitful work has been accomplished in efforts to refine the surgical procedures necessary to effect this division of the posterior root. The resultant refinement in operative technic has reduced the mortality rate to a surprising degree and has made it possible to offer these patients safe and immediate relief from their pain with the complete assurance that it will never recur.

There are, however, certain complicating factors which may be present following the operation and these must be made plain to the patient. None of these conditions approach in gravity the excruciating pain which these patients suffer. I should say that in the order of their importance these com-

phications are (1) lesions of the cornea, (2) facial paralysis (3) paresthesias, (4) difficulty in mastication and (5) a feeling of fulness in the ear

LESIONS OF THE CORNEA

Involvement of the corneal epithelium following trigeminal sensory root section may result in a serious impairment of vision due to the resulting scar. It will be realized that sensibility of the cornea is absent as a part of the sensory loss in the entire trigeminal area of distribution



Fig. 314 —Photograph of patient following trigeminal rhizotomy. Note dilatation of scleral vessels

Corneal lesions in our experience occur first as the result of an obvious direct injury to an insensitive cornea. Second they occur in those cases in which a facial paralysis has occurred. Thus an insensitive cornea is deprived of the normal protection and lubrication afforded by the palpebrum. These two types of cases are definitely preventable if proper and simple care is

given the cornea. In the last group of cases the corneal lesion occurs without direct injury to the cornea and in the presence of normal palpebral movements. In such instances the corneal symptoms are manifest immediately after operation and occur regardless of whether or not the cornea is protected by a dressing. These are the most interesting cases and afford us a definite problem for study.



Fig 315 —Photograph of patient following trigeminal rhizotomy. Note narrowed palpebral fissure, small pupil, and dilatation of scleral vessels

The symptoms which are found in this last group of patients are strikingly uniform and characteristic. The pupil becomes smaller in size and there is a definite narrowing of the palpebral fissure. Most striking of all is the dilatation of the veins of the sclera about the cornea. This picture resembles the circumcorneal injection which is always seen in an irritative lesion of the cornea in an otherwise normal eye. After a varying interval of from ten days to six weeks these symptoms gradually dis-

appear. This is hastened if the patient voluntarily keeps the eyelid closed as much as is possible. No other treatment is necessary and, in fact, is decidedly hazardous.

It will be recognized immediately that these symptoms are exactly those of a lesion of the cervical sympathetic trunk. The only difference we have noted is that in the latter cases the time required for the disappearance of the symptoms has been longer.



Fig. 316 —Photograph of patient with an herpes zoster ophthalmicus. Note narrowed palpebral fissure, small pupil and dilatation of scleral vessels.

According to Longet, Mayo in 1823 first called attention to the fact that after a lesion of the trigeminal nerve the conjunctiva of the eye becomes inflamed, the cornea ulcerated and the cheek on the same side edematous. Fodera, Magendie and Longet himself reproduced these findings experimentally by removing or destroying the gasserian ganglion. Later Magendie sectioned the posterior root and found that these

dystrophic changes in the eye either occurred not at all or were very slow in their onset. On the contrary they inevitably appeared if the ganglion was injured. Longet believed that these symptoms which followed injury to the ganglion were due to section of sympathetic fibers which pass from the carotid branch of the superior cervical ganglion to the gasserian ganglion. Claude Bernard did not support this view but just what his clinical observations in the matter were we do not know. At any rate he evidently changed his mind later because we find that he stated that removal of the superior cervical ganglion delays these symptoms by increasing the circulation and augmenting the vitality and resistance of the eye. Simitzin (1871) confirmed Bernard's last statements. He pierced the cornea of a rabbit with a glass thread, after removal of the superior cervical ganglion, and obtained no inflammatory reaction. In the control normal eye he obtained an extensive conjunctivitis with iritis, and occasionally a panophthalmitis. Section of the fifth cranial nerve produced no corneal lesion when the superior cervical ganglion had been destroyed shortly before or after the section. Lastly, the corneal symptoms following trigeminal nerve section immediately disappeared if the superior cervical ganglion was removed. These seemingly paradoxical results were denied by Eckhard and Smitleben (1894) and confirmed by Spallitta (1894). We have repeated these experiments upon cats and are able to corroborate Simitzin's results in every detail. We were careful to section the posterior root without injuring the ganglion and following this type of operation we occasionally obtained no corneal symptoms.

Many semilunar ganglia of cats have been studied histologically by Windle in conjunction with our experimental work. He made microscopic counts of the abundance and size of cells in the ganglia and of the size, number and type of fibers found in the various peripheral branches of the fifth nerve. The ganglion of the trigeminal nerve chiefly contains unipolar cells of many sizes. It is interesting to note that the small cells are arranged in groups about the periphery of the ganglion and as Allen has shown, there is a particularly striking arrangement of

such cells at the base of the ophthalmic division. These are the cells which give rise to thin black unmyelinated fibers. Windle found that after removal of the superior cervical sympathetic ganglion there was a loss of unmyelinated fibers in the long ciliary branches of the nasociliary nerve. These branches not only supply the radial muscle of the iris but also innervate the cornea which is sensitive to painful stimuli only.

These anatomic and histologic facts while not entirely conclusive suggest possible damage to sympathetic fibers at the time of operation as the causative factor in the type of corneal lesions under discussion. This occurs most probably by undue trauma to the ganglion or to an unwise and unnecessary exposure of the ophthalmic division. Clinically we have been impressed by the uniform presence of the symptoms of sympathetic trunk injury when we are dealing with a corneal lesion which is present immediately after operation and in which no direct trauma to the cornea has occurred. We have seen one instance of a herpes zoster ophthalmicus in which a Horner syndrome was present. The e symptoms disappeared as the skin lesions receded. This observation would seem to add more evidence to an injury of sympathetic fibers about the ganglion.

We are accustomed to care for the cornea of patients in a definite manner following operation. Our methods are characterized by a policy of using the natural protection afforded the cornea by the lids. We protect the eye during the operation by gutta percha sealed to the skin with warm water. This is removed after operation and the patient is instructed to be with his eyes closed. This is rigidly enforced by the nurse for five or six days after which he is asked to close the eyelids on the affected side more often than has been customary. The eye is gently irrigated each morning and night with sterile warm water. The patient is taught to do this so that we may feel assured that when he goes home he will not touch his cornea with gauze or cotton. We use no dressings of any description over the eye. They are difficult to hold in place and to our mind add a definite hazard to the safety of the cornea.

In the event of a facial paralysis we suture the lids together

immediately. It is almost impossible to keep the lids together by a dressing. Without a facial paralysis and yet with erosion of the corneal epithelium due perhaps to a foreign body or to direct trauma we use 1 per cent yellow oxid of mercury ointment and put the patient to bed with the eyes closed and the room darkened. This rather enforced treatment is very effective in saving the patient from a badly scarred cornea with impairment of vision.

FACIAL PARALYSIS

Paralysis of the facial muscles following division of the sensory root of the trigeminal nerve occurs in from 3 to 5 per cent of the cases. The paralysis may be present immediately after or it may appear some days following operation. It involves all of the facial muscles on the affected side and is therefore peripheral in type.

Many explanations have been offered for the occurrence of this complication. It has been ascribed to trauma within the pons produced by avulsion of the sensory root and to the slow oozing of incompletely controlled bleeding. The explanation of Taylor, however, has seemed most logical and certainly is based on anatomic fact. The greater superficial petrosal nerve crosses the petrous portion of the temporal bone and eventually is in close relation to the gasserian ganglion. This nerve arises from the geniculate ganglion of the facial nerve. It is not unreasonable to suppose that in elevating the dura mater from the floor of the middle fossa traction is exerted on this nerve, and thus, in turn, is transmitted to the facial nerve as it lies within its canal. Certain it is that whenever we have had a paralysis of the facial muscles it always has been in those patients in whom the dura mater was particularly adherent. We have had less facial muscle involvement since using a technical step advocated by Adson in opening the dural envelope which encloses the ganglion.

In all of our cases the facial paralysis has recovered much as does a typical Bell's palsy. Massage and electrical stimulation of the muscles plus the use of small adhesive strips to keep the muscles from sagging have aided us greatly in obtaining recovery.

PARESTHESIAS

The peculiar feelings in the face which are experienced by patients who have been operated upon offer the most trying complication for the surgeon to treat. Perhaps that is because his training in psychotherapy is usually rather deficient.

These paresthesias complained of include burning and sticking sensations in the conjunctiva a feeling described as the face held in a plaster cast formication numbness and coldness. It may be easily recognized that descriptions of the resulting sensory loss and the severity of the discomfort produced depend directly upon the mental make up of the patient. The neurotic individual usually bothers a great deal about these vague sensations for several weeks or months but it has been our experience that when he is convinced that his paroxysmal pains will not return he soon forgets about his paresthesias. He has become obsessed with the idea that the relief from his excruciating pain cannot be permanent and interprets these sensations as forerunners of an impending attack.

We have not felt that these complaints of paresthesia occur more commonly in those patients who have not had previous alcoholic injections and therefore have not before experienced this loss of sensation in the trigeminal area. We see them equally as often in those who have had many injections of alcohol. We cannot at all subscribe to the view of making an alcohol injection simply to educate the patient to a loss of sensation.

Several of our patients have complained of a soreness in the face which they have described as being deeply placed in the bone. We have never been able to satisfy ourselves as to the exact nature or origin of this complaint. All of our patients have eventually lost this symptom and so we are not yet quite prepared to anesthetize the facial nerve to determine whether or not this pain originates in a pressure pain impulse from the muscles of the face and is transmitted by the seventh nerve.

DIFFICULTY IN MASTICATION

One of the most recent steps in the perfection of surgical technic has been to sever the sensory root and save the motor root of the fifth nerve. The motor root immediately after its exit from the pons lies medial and somewhat superior to the sensory root. It then turns about the medial side of the root and passes beneath the ganglion coursing somewhat obliquely across the under surface to the medial side of the mandibular division with which it becomes incorporated. The motor root is whiter and more compact than the network of fibers which form the ganglion and merge into the sensory root. It normally is about the size of the lead of a pencil.

The loss of function in the movements of the jaw resulting from paralysis of the masseter and pterygoid muscles due to division of the motor root, is perhaps not sufficient to subject the patient to a considerably lengthened operative period necessary to save it. The patient does not suffer any noticeable discomfort in approximation of the jaw yet there is an asymmetry which can be seen. It is agreed however that if the motor root can be saved one serious objection to the operation will have been removed, particularly in the minds of those who have not been able to observe for themselves the prompt and satisfactory recovery and the complete relief from pain which follows section of the sensory root.

We have been able to preserve the motor root and separate it from the sensory root centralward from the ganglion in an increasing proportion of our cases. Its different texture and pearl gray color help identify it. We have never found it necessary to stimulate it with an electrode but such a method of identification may be used. Not to belabor the argument further we may say that we attempt to save the motor root in every instance, but do not persist in these attempts to the point of sacrificing good surgical judgment in the matter.

Regardless of whether the motor root is or is not spared a great many patients complain of losing particles of food between their teeth and cheek on the affected side. In view of the loss of sensation within the mouth, it is easy to understand how this

occurs and how it may be quite distressing. The patient easily and rapidly makes a satisfactory adjustment to this situation.

FULNESS IN THE EAR

A rather small group of individuals complain of a feeling of fulness or heaviness in the auditory canal following the operation. Careful examinations of the tympanic membrane and external ear usually offers no explanation for this symptom. Fortunately for both patient and doctor it soon disappears. Adson has recently suggested that it was caused by the collection of cerebrospinal fluid which escapes during operation, within the internal auditory canal.

While not particularly serious in itself, the uncomfortable sensation produced led one patient to introduce a hairpin into her external auditory canal in an attempt to clean it. This led to a marked dermatitis which was quite disagreeable. We have never observed any permanent diminution in hearing as a result of this condition.

These are the complaints with which patients suffer after their terrific paroxysmal neuralgic pain has entirely disappeared. It is important that they be recognized and their prophylaxis and treatment be emphasized to the patient. Success in their treatment means the entire difference between a completely satisfactory and happy restoration and a condition of relief from pain marred by disquieting and annoying symptoms.

CLINIC OF DRS. W. T. BELFIELD AND H. C. ROLNICK

FROM THE UROLOGIC DEPARTMENT OF RUSH MEDICAL COLLEGE AND
NORTHWESTERN UNIVERSITY MEDICAL SCHOOL

ENLARGED PROSTATE OR VESICULITIS? OPERATIVE TREATMENT OF GONORRHEAL RHEUMATISM

Case I.—Three years ago this patient, then seventy years old, underwent suprapubic prostatectomy in one operation performed by an expert general surgeon. After a perilous convalescence, including a right-sided epididymitis, he left the hospital—wound healed, but urinating painfully every hour or less day and night. A month later he was brought to us by his brother, a physician, who stated that in spite of bladder irrigations, internal antiseptics, and rest in bed the frequency and pain in urinating had not abated. Before the operation the patient had risen three or four times every night, voiding without pain; now he was voiding ten or more times each night with much distress. As these symptoms were ascribed to a stubborn cystitis, suprapubic drainage had been considered. Moreover, the patient's urine, free from albumin before the operation, now gave a heavy precipitate by heat or nitric acid.

The epididymitis proved, of course, infection of the right seminal vesicle, which the finger in the rectum found large and tender. Bladder urine was cloudy with pus; heat and nitric acid each produced a heavy white coagulum, which, according to current conception, should have been albumin from diseased kidneys. That it was not albumin and that it did not proceed from the kidneys was proved by two measures: 1. The urine was mixed with an equal volume of saturated solution of ammonium sulphate, which produced a heavy white precipitate; when this was removed by filtration the filtered urine gave a

much smaller precipitation by heat or nitric acid. The heavy precipitate of albumin in the original urine was then not albumin but chiefly globulin and conjugated proteins which exist in large amount in the contents of the normal seminal vesicle and in larger amount in infected vesicles from which it passes into the prostatic urethra and thence into the bladder.

2 That these albuminoids did not issue from the kidney was shown by catheterism of the ureters: the urine issuing from these catheters gave no precipitate on the addition of nitric acid.

As the residual urine was only about 30 c.c. and the cystoscope showed the prostatic wound almost healed and no calcareous flakes present it was concluded that the urinary distress and albuminuria were caused entirely by the suppurating seminal vesicle. Accordingly vasotomy was made: the purulent content of the vesicle washed out by copious irrigation with sterile water after which ampulla and vesicle were filled with 5 per cent collargol solution. That night the patient retained urine over three hours at a stretch: the first comfortable night since the prostatectomy eleven weeks earlier. Three days later he left the hospital: in ten days more the urine was free from collargol and from pus: the albumin in the urine gradually decreased and disappeared about three weeks after the vasotomy and has never reappeared during the three years that have since elapsed. During this period he has risen at night to urinate usually once sometimes twice sometimes not at all: he has practised his profession and enjoyed his annual duck shooting.

It is a common practice to avert epididymitis by bilateral vasectomy or vasoligation prior to or coincidentally with prostatectomy. But this cannot avert the vesiculitis of which epididymitis is an extension: nor the frequent and painful urination which as in the patient before us vitiates a skilful removal of the prostate leaving the patient's symptoms no better even worse than before operation. In time it may become customary not only to make a preliminary vasectomy but also to use this incision to cleanse the vesicles by irrigation with water and to fill them with iodized oil. We may go further and say that this

recognition and treatment of the vesicles in old men has in some cases restored the urinary function and rendered a contemplated prostatectomy unnecessary.

Case II.—This second patient is an illustration of the causation by vesiculitis of the symptoms usually ascribed, if the patient be gray haired, to enlarged prostate, to be relieved by prostatectomy.

He is sixty-two years old. A year ago, following a rough and cold automobile journey, he began to rise at night, at first only two or three times, then more and more frequently until during the past two months his urinations night and day have occurred less than one hour apart. Twice complete retention required the catheter, which he learned to use himself, occasionally voiding has been so difficult and incomplete that he has introduced the catheter. A physician diagnosed prostatic enlargement and suggested prostatectomy, however, as heat and nitric acid produced a heavy white precipitate, the assumed renal disease seemed to contraindicate this operation.

The finger in the rectum detected no enlargement of the prostate, but discovered the seminal vesicles much distended and tender. Gentle massage of these caused a half-teaspoonful of pus to run out of the meatus, at once relieving the sacral pain which was one of the patient's constant complaints (a common feature of vesiculitis). Urologists know how commonly the unpractised finger fails to differentiate the prostate from the distended vesicles which lie in contact with it. The heavy precipitate in the urine was found by the method above described to consist chiefly of the vesicular albuminoids, not renal albumin.

After negative cystoscopic findings, this patient's urinary distress was ascribed not to enlargement of the prostate but to infection of the vesicles; the logical remedy was bilateral vasotomy. Before advising this we made tentative use of a remedy which we have found sometimes to abate vesiculitis—we injected sulpharsphenamin 0.4 gram, dissolved in 2 c.c. distilled water, into the gluteal muscles. Four days later he reported that his urinary intervals were more than doubled and voiding

almost painless the pus cloud in the urine was markedly reduced. He appears today five days after the second injection rising three times at night having no pain and no need for the catheter since the first sulpharsphenamin injection. Two more injections will probably give the maximum benefit after which further treatment if any will be determined.

Case III—You saw this young man five weeks ago when he first came to this clinic pale emaciated crippled with gonorrheal rheumatism of the right hip joint of six months standing with a urethral discharge containing gonococci which began three months before the hip became crippled. Both the joint disease and the chronic discharge pointed to the seminal vesicles as the foci of infection as did also the pus cloud in the urine. You saw massage of the vesicles cause pus to run out of the meatus and the bilateral vasotomy which followed. After irrigation of the vesicles with water they were filled with 5 per cent collargol solution and the patient went home. You saw him return a week later walking looking and feeling much better. Today five weeks after the vasotomy he walks normally has no urethral discharge his urine is clear he has almost regained his normal weight and says he feels his old self. Current treatment of gonorrheal rheumatism does not recognize the vesicles as the source of the infection it consists of local applications to the diseased joint with injection of vaccines and foreign proteins. All of this had been done for this patient without avail. The sterilization of the vesicles through vasotomy stopped the constant production of the toxin in the vesicles and absorption into the blood. Toxemia ended nature did the rest. Many cases of gonorrheal rheumatism have been promptly cured by vesiculotomy as well as by the minor operation vasotomy.

These 3 cases which might be multiplied many times out of our own personal experience suggest the following comment.

1 Infections of the seminal vesicles may cause frequency and pain in urination and pus in the urine—symptoms that are commonly ascribed to cystitis and treated by urinary

antiseptics and bladder irrigations without avail in such cases. Removal of the infection in the vesicles cures the condition.

2 These same symptoms misinterpreted as cystitis, may inspire a mistaken diagnosis of senile prostatic enlargement if the patient be elderly, or the two conditions may coexist, or the vesiculitis may follow prostatectomy making the patient's condition worse after than before operation as illustrated in Case I.

3 Heat and nitric acid coagulate not only blood serum in the urine from diseased kidneys but also globulin and conjugated proteins from diseased seminal vesicles as in Cases I and II. Failure to distinguish between these two coagula has caused erroneous diagnoses of renal disease as in Case II.

4 Epididymitis except when of hematic origin is always an extension of pre existing vesiculitis. To treat acute gonorrheal epididymitis by epididymotomy or diathermy without treating the vesiculitis, is no more rational than is mopping up a wet floor without shutting off the running faucet.

5 Search for the remote causes of arthritis and 'rheumatism' should include not only teeth, tonsils and sinuses but also seminal vesicles, for these two closed cavities each holding 5 to 8 c c, are very frequently infected from the urethra by the gonococcus in youth by pyogenic bacteria in later years and from the blood throughout life, and are known to be the frequent source of toxemia, arthritis, intis disease of serous membranes and muscle sheaths and impairment of nutrition, locally vesicular infection may cause pelvic and perirectal abscess, hydronephrosis by adhesions to the ureter pseudohernia (in dustral hernia") by extension along the sheath of vas deferens to the inguinal ring.

It devolves upon the urologist to entreat surgeons as well as physicians to *place the seminal vesicles on the clinical map*

CLINIC OF DR. EDWIN M MILLER

PRESBYTERIAN HOSPITAL

CHRONIC DUODENAL ILEUS

IN recent years, particularly since 1907, when Dr. Staveley, of Hopkins, devised the operation of a direct anastomosis between the duodenum and the jejunum, an interest has been aroused in the subject of chronic duodenal ileus such as to give it a prominent place in medical literature, and to cause it to be a frequent topic of discussion on the part of both internists and surgeons.

The cause of this condition seems well defined. In the light not only of numerous reports from the autopsy room, but from the findings at the operating table as well, the etiology in most cases can be directly traced to the embryologic rotation of the bowel whereby the duodenum in its third or retroperitoneal position comes to occupy a precarious position in the angle between the root of the mesentery of the small bowel in front and the aorta and spinal column behind, a position where the size of its lumen is constantly subject to change by forces which alter the acuteness of this angle, either from behind, as in lordosis of the spine, or from in front, as from large intra-abdominal tumors, ptosis of the small bowel, transverse colon, or of the abdominal viscera in general.

The effect of such an interference with the normal caliber of the duodenum as far as the production of symptoms is concerned must obviously depend upon the degree of narrowing obtained, and whether it is constant or intermittent in character. As a matter of fact, the intermittent character of the symptoms seems to be an outstanding feature of the usual clinical picture, and is therefore strongly suggestive of an inconstant variation from the normal relations. In mild cases the

sole complaint may be frequent headaches slight nausea and a feeling of fulness after meals In a more advanced case a distressing nauseating often cramp like pain in the epigastrium after eating which is relieved only by vomiting or a change of posture to the recumbent position In an extreme case severe abdominal attacks ushered in often suddenly with excruciating pain violent nausea and biliary vomiting which may continue for hours or even for several days leading to a state of profound exhaustion and rapid dehydration

From the point of view of diagnosis chronic duodenal ileus is of more than usual interest in that it may so closely simulate the clinical pictures produced by lesions of the gall bladder and ulcers of the stomach or duodenum In fact it is only after ruling out both of these that one's attention is seriously drawn to the probability of the lower duodenum as being the real seat of trouble True it is that the general build of the patient with his long narrow trunk and prominent lower abdomen may be highly suggestive and the statement of the patient that his distress after meals is greatly relieved by lying down may seem an important bit of evidence yet it is only by the finding by means of the fluoroscope of a delayed emptying of the duodenum and a definitely abnormal dilatation of its lumen that a diagnosis can safely be made

Having arrived at the diagnosis the treatment obviously must vary with the severity of the case If the symptoms are of mild degree it is quite possible that by careful attention to the diet and the putting on of enough fat to increase the support for the abdominal viscera the more radical measures may effectively be forestalled In a well defined case however in which a definite obstruction of the duodenum exists and gives rise to serious symptoms nothing short of surgical relief will suffice

Within the past two years I have had occasion to operate upon 5 cases of chronic duodenal ileus 4 of whom were men and 1 a woman From these I have selected one for your consideration which well illustrates the fundamental points involved

H. D., physician, age forty-seven years, presented himself at the Presbyterian Hospital June 9, 1926 on the service of Dr. Ralph C. Brown, complaining of pain in the epigastrium, nausea, vomiting, and loss of weight. According to the history his whole trouble dates back to 1902, at which time he enjoyed excellent health and weighed 155 pounds. That winter a cart wheel ran across his upper abdomen, causing him to be confined to bed for six weeks. A year later he was kicked by a horse in the pit of the stomach, was temporarily disabled, but soon

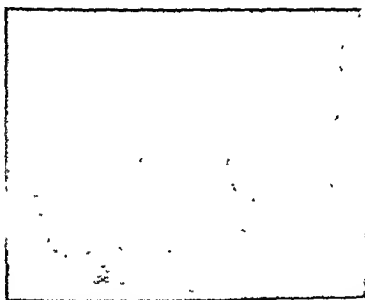


Fig. 317.—The general contour of the duodenum as seen in the prone position, showing the moderate dilatation of the third portion

returned to work. In the winter of 1903-04 because of a pulmonary tuberculosis he was obliged to seek a different climate, and for five years lived a lonely life in New Mexico, feeling for the most part fairly well except for periodic attacks of nausea and vomiting. In 1908 he fell ill with pneumonia, an empyema formed, and drained spontaneously for want of medical care. This gave him a new lease on life and within two months he had gained 20 pounds. Ten years later he returned to the middle west and because of poor health entered a medical clinic, where a diagnosis of Addison's disease was made because of the

marked pigmentation of his skin. In 1919 he was operated on for epigastric hernia and a year after developed a jaundice which led to a diagnosis of a tumor of the pancreas. In 1922 his abdomen was opened at a hospital in Chicago; nothing abnormal was seen and the incision closed. Temporarily he had relief, being free from symptoms for almost two years, only to

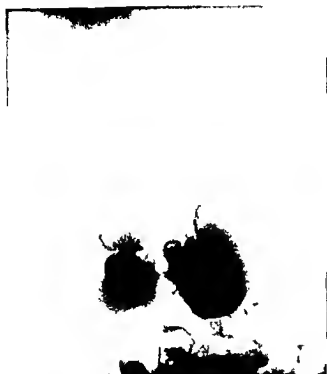


Fig. 318.—An upright view showing the extreme boudening of the dependent part of the duodenum.

have a recurrence of his former complaints in the form of acute abdominal attacks occurring at intervals of three to four months and lasting four to five days at a time until the current year during which they became very frequent and progressively more severe. They would as a rule come out of a clear sky, often awakening him in his sleep with nausea and pain in the epigastrium and right upper quadrant, rhythmic in type, relieved

by vomiting and associated with profuse perspiration. So severe had this pain become at times that he took morphin for relief.

Upon entrance to the service of Dr. Brown he weighed 103 pounds, a loss of 52 pounds since his trouble first began. Within a few days his nausea ceased, he gained 2 or 3 pounds, and he was able to retain a barium meal for fluoroscopic study. The



Fig. 319—The fluid level of material retained in the dilated loop at a time when the stomach was almost empty.

accompanying films well illustrate the striking abnormal findings (Figs. 317-319). With these findings the diagnosis was not hard to make and operation was advised. Upon opening his abdomen I was struck with the enormous dilatation of the duodenum (about three times the normal size). The first part of the jejunum appeared normal. A few adhesions were seen at the duodenojejunal angle. No constricting bands were

found. The gall bladder was normal. As far as could be determined the obstruction of the duodenum was in its third portion beneath where the root of the mesentery crosses in front. An opening was made in the transverse mesocolon between the right and middle colic vessels, the dilated bowel brought through and an anastomosis made with the jejunum at a point 7 or 8 inches below the duodenojejunal angle using the three row method of suture similar in all respects to that of a gastroenterostomy. His recovery was uneventful. He left the hospital in three weeks, gained rapidly in strength and within a period of six months had put on over 40 pounds in weight. He has been free from symptoms up to now, is working every day, and considers himself cured.

By way of emphasis let me repeat. Chronic duodenal ileus has become well established both as a pathologic and clinical entity as definitely as chronic disease of the gall bladder or of ulcer of the stomach. It probably occurs frequently much more frequently perhaps than one would suspect. The diagnosis can be made with certainty as great certainty as can chronic obstruction elsewhere in the gastrointestinal tract. Its treatment is well defined and the results when accurately carried out are as striking as one sees anywhere in the field of clinical medicine.

CLINIC OF DRS ARTHUR H PARMELEE AND EDWIN M MILLER

PRESBYTERIAN HOSPITAL

CONGENITAL BOWEL OBSTRUCTION

CASES of congenital atresia and stenosis of the gastro intestinal canal have been rather frequently reported. Most of them have a marked similarity in the character of the defect and differ chiefly in the degree of obstruction and location. They may occur at any point in the gastro intestinal canal but there are certain favorite sites, for example in the esophagus at the level of the bifurcation of the trachea and at the cardia in the duodenum, at or near the pylorus junction of the proximal and middle thirds, and at the level of the ampulla of Vater in the ileum at the omphalomesenteric attachment and at the ileocecal valve, in the colon at the flexures, and in the rectum near or at the anus. An exhaustive analysis of this congenital abnormality will not be presented as we desire to confine our remarks to 1 case which differs from those usually described and has many points of clinical interest.

This baby was delivered in the Presbyterian Hospital by Dr Heaney December 25, 1925 at full term weighing 7 pounds 15 ounces. The father and mother are young and healthy. They have one other child, three years old, who is well. There have been no miscarriages. At the time of delivery Dr Heaney observed that the infant's abdomen was unusually large but in other respects he appeared to be normal. Ten hours after birth I (Dr Parmelee) was asked to see him because he had vomited. His abdomen was much distended, and very definite peristaltic waves were seen over the upper and middle portions. Not being confined to the epigastrium they suggested dis-

tended loops of bowel and upon inquiry it was learned that no meconium had been passed since birth. Even with a suppository and an enema there was no evidence of the presence of meconium or gas in the lower bowel. Inasmuch as a bowel obstruction seemed probable surgical consultation was obtained and Dr. Vernon David and Dr. F. M. Miller were able after considerable difficulty to insert a medium sized catheter into an apparently empty rectum through which passed some catarrhal mucus and flecks of desquamated epithelium but no meconium and no gas. After making a plain x-ray plate which showed well the distended loops of bowel a solution of sodium iodid was injected into the colon through the catheter while under the fluoroscope. It passed readily into the colon which was in caliber one half that of normal as far as the cecum. No solution could be detected however beyond the ileocecal valve, and when it was expelled after removal of the tube there was no gas and the solution was still perfectly clear. From these observations it seemed evident that the site of obstruction was probably proximal to the cecum.

Feeling that the obstruction might be due to a temporary plugging of the lumen rather than an anatomic defect in bowel continuity it was thought advisable to delay surgical intervention for a brief time. During the following eighteen hour interval however the child failed to pass either gas or meconium the vomiting continued and the abdomen became progressively more distended. An x-ray made at this time confirmed the clinical findings and emphasized the necessity for immediate surgical relief.

Having in mind the extremely high mortality associated with attempts to relieve a congenital bowel obstruction of any type two things seemed very important. First that the operation be done under local anesthesia second that as little as possible should be done provided the relief of obstruction was accomplished. As may be seen in the drawing (Fig. 320-1) a muscle-splitting incision was made (Dr. Miller) in the right lower quadrant with the idea that a distended loop near the terminal ileum could be found more easily through that approach.

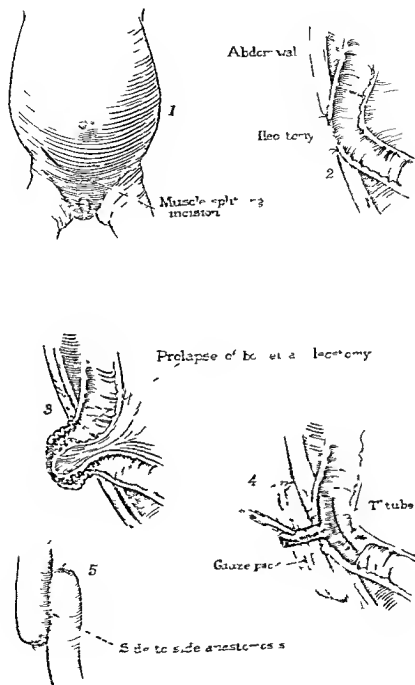


Fig 320

than through an incision near the midline. Upon opening the peritoneum a dilated loop at once presented and was immediately sutured to the margins of the wound before it was opened thus closing off effectively the peritoneal cavity from contamination (Fig. 320-2). The material which oozed from the open bowel was a very thick dark green meconium with a small amount of gas. To facilitate its exit and to hasten collapse of the bowel a catheter was passed into the proximal segment through which by irrigation a considerable amount of gas and meconium were obtained. Thus irrigation of both proximal and distal loops with normal saline was continued at intervals during the next twenty-four hour period with very good results, the distention became greatly decreased, the vomiting ceased, and the child's general condition improved. Breast milk and water were taken eagerly and soon pale canary yellow material of a thin gruelly consistency was expelled freely and frequently through the wound. In spite of a sufficient breast milk intake, i. e., 18 ounces in twenty-four hours, the body weight continued for several days to drop rapidly. This we felt was due to an insufficient absorbing surface on account of the fact that the ileostomy opening had been made at a higher point on the bowel than we had expected and hoped it would be.

On the fifth day following operation, much to our surprise some meconium was passed spontaneously through the rectum, and small amounts continued to pass the following day furnishing ample evidence that the obstruction had opened up. The thought then occurred that the bowel distal to the ileostomy might be utilized as an absorbing surface at least for water and probably for food. To start with, salt solution was introduced in small amounts by gravity. This seemed to do very well, so we began collecting at each feeding period the material passed through the ileostomy wound from the proximal segment and reintroducing it through a catheter into the distal segment. This could be accurately done because a gauze pad held firmly over the wound by adhesive strips prevented the loss of much material in the interval between feedings. True breast milk stools soon began to appear at frequent intervals at

the rectum proving conclusively that the obstruction which was complete at birth was now entirely relieved. The loss of weight then ceased and a slight gain was temporarily achieved.

Before many days had passed however another complication had to be met. Whenever the gauze pad was removed to allow the content of the upper segment to be collected it was found that the posterior wall of the bowel would easily prolapse (Fig 320, 3) and protrude an inch or more through the opening. It then occurred to us that by introducing into the lumen of the bowel a soft rubber T tube (Fig 320, 4) not only could the prolapse be prevented, but the content of the upper segment might readily pass through and around the tube into the lower segment. This was faithfully tried for many days, but in spite of every effort considerable material was lost through the wound, and a gain in weight was impossible. When at the end of six weeks it was apparent that the infant weighed only 6 pounds in spite of a sufficient breast milk intake, and that the general condition was becoming rapidly worse instead of better it was agreed that an attempt should be made to close the ileostomy. On January 16th, therefore, under local anesthesia the edges of the bowel were freed from the abdominal wall and closed transversely, hoping thus to obviate a narrowing of the lumen. This was not successful and a resection with lateral anastomosis had to be done (Fig 320, 5).

The fatal outcome was not unexpected. Fortunately an autopsy was obtained, and in addition to a terminal broncho pneumonia with multiple lung abscesses and a local peritonitis about the suture lines it revealed beautifully the cause of the original obstruction (Fig 321). The terminal ileum for a distance of 3 inches was diminished in caliber to one third of its normal size and had no mesentery. In all probability this segment was plugged by inspissated bowel content and was subjected to external pressure by the neighboring distended loops. As a result of relief of the obstruction by ileostomy and the introduction of fluids from above and below the impacted material in the narrow terminal ileum gradually loosened up and passed on through the distal segment.

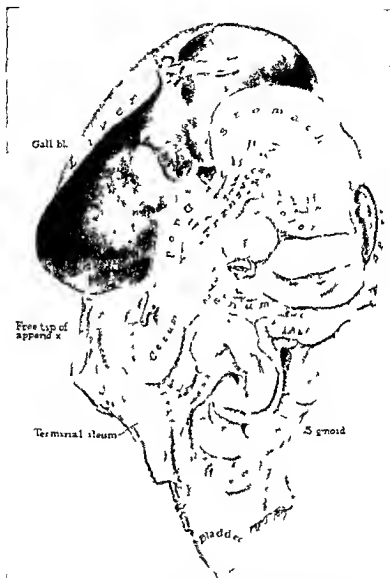


Fig. 321.—Drawing made from autopsy specimen in an infant born with a complete intestinal obstruction just proximal to the ileocecal valve. The small caliber of the terminal 3 inches of ileum (which has no mesentery) can be seen.

To you who listen to the progress of this case it might seem as though an error in judgment had been made on the part of the surgeon because at the initial operation he did not widely open the abdomen, seek the cause of the obstruction and make an immediate anastomosis around it. We believe however, that if this had been attempted it is highly probable that the effort would not have been successful.

CLINIC OF DR JEROME R HEAD

FROM THE SERVICE OF DR C A HEDBLOM RESEARCH AND
EDUCATIONAL HOSPITAL UNIVERSITY OF ILLINOIS

THE TREATMENT OF CHRONIC EMPYEMA

DAKIN'S solution the multiple stage thoracoplasty and roentgenographic visualization with opaque media have changed radically the aspect and prognosis of chronic empyema. From its former status as one of the most chronic and dreaded conditions curable only by extensive operations which carried a high mortality it has become of all the thoracic diseases one of those most surely and safely cured. By frequent irrigations with Dakin's solution the cavity can be sterilized and the patient relieved immediately of his burden of sepsis. The same treatment carried out over a period of weeks or months accomplishes gradually a chemical decortication which reduces materially sometimes even obliterates the cavity. When the patient comes finally to operation he has recuperated from all save the permanent effects of his chronic sepsis has gained many pounds in weight and is as compared with his earlier condition a good operative risk. His cavity is 50 to 90 per cent smaller than at the outset and having been localized by roentgenograms taken after the injection of a contrast medium presents to the surgeon a definite and predetermined problem. Shock the complication which formerly accounted for most of the operative mortality has been eliminated by the multiple stage operation. If death occurs from it it is because the surgeon has misjudged his patient and frequent pulse and blood pressure readings taken during the operation guard him against this.

The following case report illustrates the technic and the results of such treatment as carried out on the thoracic service of Dr C A Hedblom

Mr B M a single American painter of twenty five years entered the Research and Educational Hospital on June 23 1926 complaining of weakness loss of weight and a draining sinus in his right chest which had been present since a bullet wound inflicted six months previously

In January 1926 he was shot with a 32 caliber revolver the bullet entering in the left second intercostal space in the midclavicular line and lodging in the erector spinae muscles just to the left of the ninth thoracic vertebra—whence it was removed He was critically ill for several weeks after the injury The wound of entrance did not heal and soon began draining greenish pus With the exception of brief intervals during which he has had pain and fever it has drained steadily since He has been able to be up and around but has been unable to gain in weight or strength At present he is 50 pounds under weight

Physical examination revealed a well developed but definitely emaciated young man not acutely ill and able to walk about the ward Examination of the chest revealed slight retraction and marked immobility of the left side In the second intercostal space in the midclavicular line was a small sinus draining thick greenish pus Percussion showed dullness to flatness throughout the left chest posteriorly and from the level of the sinus downward into the axilla anteriorly The lower part of the left chest was normally resonant The right lung was normal Temperature 100.5° F pulse 110 130 respiration 23 vital capacity 3300 c c weight 128½ pounds

For x ray findings at the time of admission see Fig 322

On June 28 1926 a needle was inserted into the cavity through the fifth intercostal space in the posterior axillary line and pus aspirated The needle was then withdrawn under local anesthesia a trocar and cannula were inserted at the same site and a catheter—22 French—introduced through the cannula The cannula was removed and the catheter left in place The

remainder of the pus was then aspirated, using a McElroy asbestos plunger syringe, and the cavity washed clean with normal salt solution. It is the practice always to use salt solution for the first irrigation for fear that a bronchial fistula may be present, in which case the use of Dakin's solution is contraindicated. If the salt solution does not elicit cough, the absence of a fistula is assumed. In this case there was none present, and the cavity was consequently washed clean with Dakin's solution every two hours each day thereafter.



Fig. 322.

The patient was put upon a high caloric diet with midmeal feedings and was given a tonic and Bland's pills.

On this treatment his temperature and pulse fell to normal immediately and continued so thereafter. His appetite became enormous, his weight increased steadily and rapidly, his hemoglobin and red blood-count rose, and the cavity decreased in size. Drainage from the sinus ceased and the wound healed. The treatment was kept up for sixty-nine days. At the end of

this time he had gained 38 pounds in weight was in perfect health his hemoglobin and red blood cell count had returned to normal and his cavity held only 11 c c a decrease of 92 per cent For the first month he gained on an average of 1 pound a day

Because during the last two weeks no further reduction of the cavity had occurred and because his general condition was excellent it was concluded that little more could be accomplished by further irrigation and that it was time to operate Roent



Fig 323

genographic visualization of the cavity after the injection of iodized oil (lipiodol) showed it to be single and located beneath the body of the scapula (Fig 323)

Incision 20 cm long parallel to the lateral border of the left scapula in the direction of the fibers of the latissimus dorsi The sinus was at the middle of the incision The sinus was followed down by splitting the muscle to the level of the ribs Segments of the ribs above and below the sinus tract were

resected and the intervening intercostal bundle cut away. This gave free access to the cavity, which was found to be watch-crystal in shape, 8 by 12 by 2 cm in dimensions, and to extend backward under the body of the scapula almost to the transverse processes. It was covered by the sixth, seventh, eighth, and ninth ribs. The portions of the sixth and seventh ribs which still overlay the cavity were then resected well beyond its limits. Although the patient was in good condition it was deemed advisable to complete the operation at a later date for fear that the whole procedure would be too much. The wound was packed with iodoform gauze, its extremities approximated with silkworm-gut sutures, and the patient returned to the ward.

The patient stood the operation well. One week later the second stage was performed. At this time the segments of the eighth and ninth ribs overlying the cavity were resected well beyond its edges, the greatly thickened parietal pleura and intercostal tissues cut away, and a flap of the latissimus dorsi stitched into the residual depression. A catheter leading out of the wound was placed under the muscle flap, and the wound closed tightly about it with silkworm-gut and dermal sutures.

The patient stood the operation well. Dakin's solution irrigations were continued as before the operation. He was able to be up five days later, and on September 24, 1926, three weeks after the last operation, the catheter was removed and the patient discharged to the dispensary. The sinus healed rapidly, and one month later, when last seen, the patient was back at work painting, weighed 166 pounds, and felt as well as ever in his life. There was no deformity of the chest or disability of the arm.

This case illustrates exceptionally well the value of Dakin's solution irrigations, roentgenographic visualization with an opaque medium, and the multiple stage thoracoplasty. At the time of entrance he was 50 pounds under weight, was running an evening temperature and a rapid pulse, and had a severe secondary anemia. There was ample evidence that the heart, kidneys, and all other vital organs were working under the handicap of a severe chronic toxemia. At this time any attempt

to obliterate the cavity by operation would have been extremely hazardous

After approximately two months of irrigations and of dietary and hygienic treatment the aspect of the case had changed markedly. The weight had increased 38 pounds, the temperature and pulse had been normal for many days, the hemoglobin and red blood count had risen, and, all in all, the patient felt and appeared robust and in perfect health. This was in striking contrast to his emaciated and toxic conditions at entrance. The cavity held 11 c c (at operation it was found to be somewhat larger) and its obliteration by a two stage thoracoplasty and muscle graft was a simple and safe procedure.

CLINIC OF DR. H. HOYT CON

WESLEY MEMORIAL HOSPITAL

ACUTE BACKACHE—DIAGNOSIS AND TREATMENT

PATIENTS complaining of acute backache are seen very frequently by most of us. The condition is a mechanical one and comes on suddenly, usually while attempting to lift a heavy object or by missing a step while climbing stairs. The condition is one which is woefully neglected and misunderstood by the medical profession in general, the patient receiving as a rule some aspirin or atophan and the condition being diagnosed sciatic rheumatism or lumbago.

The condition is usually unilateral, the pain being centered over the sacro iliac joint, but it may involve both joints and be complicated by a severe sciatica.

The patient which I will first present is a man thirty two years of age, a painter by trade. He was in perfect health until yesterday afternoon when he attempted to lift a heavy keg of lead. As he attempted to raise the keg he suddenly felt an excruciating pain in the left sacro iliac region and was forced to drop the weight. He was unable to straighten up but was able to come to the hospital with assistance. His pain is accentuated by all motions or postures requiring movements of the sacral region, such as sitting, getting up and down, stooping or even lying down.

Physical examination discloses a young man who appears to be in great pain, and who stands in a stooping position with his right hand over the right sacro iliac joint and his right knee flexed. Upon close inspection we note that there appears to be marked prominence of the sacrum, a straight back with almost complete obliteration of the lumbar curve. Rigidity and

spasm of the spinal muscles is present with a lateral curvature of the spine away from the side affected. We will ask him to flex his right thigh with the knee extended and we note that the effort produces great pain. When he abducts the thigh or rotates it outward there is no pain but adduction or inward rotation produces severe pain. Compression of the iliac crests produces severe pain.

There is marked tenderness to pressure over the right sacro iliac joint.

Now what has happened to this man? He was in perfect health one minute and in the next he was disabled. It is apparent that something mechanical has happened. Infections do not come on in this sudden manner. The differential diagnosis should consider a contusion, hypertrophic arthritis of the lumbar vertebra or sacro iliac joint, tuberculosis of the lower vertebrae or sacro iliac joint, the so called lumbago or a mechanical displacement of the sacro iliac joint.

There is no history or sign of a contusion. Arthritis would not make its appearance in such a sudden manner, the characteristic onset being slow and insidious with gradually increasing pain. With hypertrophic arthritis the limitation of the motion would be constant and would not be influenced by changes of position or support.

Tuberculosis would also have a more gradual onset and the pain would be of a dull aching character worse at night. Abscess formation usually occurs early and the changes can usually be seen early by the roentgenogram. Most cases of lumbago according to Goldthwait and Magnuson are subluxations of the sacro iliac joint. There are however certain cases of true myalgia affecting the lumbar muscles which are of an infective nature and of slow onset. The pain extends across the back above the sacro iliac joints and there is a marked tenderness over the lumbar muscles. The patient complains of a stiff painful back which is relieved by sitting or lying down. Upon arising he has difficulty in straightening the body.

Here we have a man in perfect health who attempts to lift a keg of lead and suddenly feels a severe pain in his right sacro

iliac joint and cannot straighten his body. His lumbar curvature is obliterated and he has marked tenderness over the right sacro-iliac joint. The x ray shows a slightly increased separation between the sacrum and ilium. Otherwise the physical examination is negative.

We must conclude that some mechanical injury of the right sacro iliac joint has occurred. Subluxation of the sacro iliac joint is by no means new, having been described in detail by Goldthwaite,¹ Albee,² Magnuson³ and many others.

A brief review of the anatomy involved will help to secure a better understanding of the pathology. The articulation is a true joint, but so formed that it represents the keystone of an inverted arch, and thus the strength must of necessity depend upon the surrounding ligaments. These are the anterior and posterior sacro-iliac ligaments, the latter being much the stronger. The interosseus ligaments are short fibrous bands which lie on the dorsal surface and are completely covered by the posterior sacro iliac ligaments. They extend from the sacral tuberosity to the iliac tuberosity and fill the depression behind the joint cavity between these two rough surfaces. The lumbosacral cord passes over the brim of the pelvis directly over the part of the sacro iliac joint where it is bound closely to the anterior ligaments of the joint, and passes anteriorly down and outward to the lower pelvis and leg. In any displacement the edge of the bone is so exposed that pressure or stretching of the plexus can hardly be avoided. Thus the severe sciatica, which frequently accompanies sacro iliac subluxations can readily be explained.

Motion is present normally in the sacro iliac joints and a sudden violent strain, such as lifting a misstep sudden bodily twist, and so forth, can easily produce a displacement of the bones. This separation can be either anterior or posterior, that is the ilium slips forward or backward on the sacrum which remains stationary. The anterior displacement of the ilium is by far the most common, occurring probably in 95 per cent of the cases. The mechanism necessary for this displacement appears to be the same in almost every case the conditions exist-

ing at the time of injury being a sudden hyperextension of the spine together with a violent pull of the extensors of the legs which are attached to the anterior part of the ilium and below the knee. These two forces acting suddenly in opposite directions cause the ilium to be brought forcibly anterior and the roughened surfaces of the sacrum and ilium interlock producing and maintaining the dislocation.

Keeping in mind the existing pathology we will attempt to reduce the subluxation. The patient is placed on the table face downward his weight being supported by the elbows and ab-



Fig. 324 —Illustrating reduction of subluxation

domen and his hands grasping the edge of the table securely. I will stand on the table and lift the patient by the ankles so that the abdomen is clear of the table and is supported only by the elbows above. I will make strong traction on the affected limb while my assistant makes firm pressure over the sacrum. You will note that the lumbar curve is now restored and that the patient's pain has disappeared. We will now strap him securely with 2 inch adhesive straps extending from below the trochanters to the crest of the ilium.

The explanation of the manipulation is as follows. In lifting the patient's body by the ankles we are hyperextending the

spine and thus relaxing the strong posterior sacro iliac ligaments and also relieving the joint from the pull of the hamstrings. The strong pull upon the leg unlocks the joint by increasing the deformity by the pull of the quadriceps muscles attached by the upper part of the ilium. The weight of the body and the downward pressure over the sacrum favors replacement of the ilium backward by forcing the sacrum forward.

After replacement we must hold the bones in position. This is best accomplished by a firm adhesive dressing as you have seen which should be replaced in about four days and finally removed at the end of a week.

I advise these patients to go to bed for one week or longer depending upon the severity of the injury and the time which has elapsed before proper treatment has been instituted. Occasionally and especially when a history of previous subluxations exists a firm belt with a sacral pad lacing down below the trochanters and extending to the level of the iliac crests should be worn for several months. These patients should be warned against stooping or sudden twisting of the body.

The majority of acute backaches are due to sacro iliac subluxations and their response to the treatment shown is little short of spectacular.

(Subsequent history of the case showed the patient able to return to work after one week with no further disability.)

BIBLIOGRAPHY

- 1 Goldthwaite J E and Osgood R B Consideration of Pelvic Articulations from Anatomic Pathologic and Clinical Standpoint Boston Med and Surg Jour May 25 and June 21 1905
- 2 Albee F H A Study of the Anatomy and Clinical Importance of the Sacro iliac Joint Jour Amer Med Assoc 1909 53 1213-1216
- 3 Magnuson Paul B Backache Acute and Chronic from a Mechanical Standpoint Read at a joint meeting of the Associations of Surgeons of the I C and V and M V Railroad Companies Chicago May 26 27 1916

CLINIC OF DR. J. P. GREENHILL

CHICAGO LYING-IN HOSPITAL

OPERATIONS DURING PREGNANCY

Summary.—Very little hazard of operating during pregnancy. Preoperative, operative, and postoperative precautions. Seven illustrative cases I. Dermoid cyst II Suspension of pregnant uterus. III. Vaginal cyst IV and V. Cervical polyp. VI. Repeated cauterizations of cervix with electric cautery. VII. Hemorrhoids

In previous years operations on the genital and pelvic organs during pregnancy were rarely done, and even operations on non-genital organs during gestation were unusual performances. Nowadays we do not have the same hesitancy concerning these operations, because with improved technic, better asepsis, and proper postoperative treatment the danger to life is practically no greater than for operations on non-pregnant individuals. When operations are performed in regions other than the genital tract there is almost no risk of interrupting pregnancy, but when the operations are done on the internal genital organs during pregnancy there is definite danger of abortion or miscarriage. The earlier in pregnancy operations are performed on the internal genitalia, the greater the likelihood of interrupting the gestation. Operations on the external genitalia except the cervix have practically no effect on pregnancy.

CASE REPORTS

During the past year I have had occasion to operate on a few women during pregnancy, and I should like to discuss these cases with you.

Case I—Mrs R R a primipara aged twenty three married three years came to see me for the first time August 20 1926 because of sterility and dysmenorrhea Her family history was negative At the age of fifteen her appendix was removed because the physician said it would cure her dysmenorrhea While it is true that in exceptional cases an appendectomy may cure dysmenorrhea it is neither wise nor honest to assure a patient that removal of an appendix will bring relief from dysmenorrhea In this patient the operation had no effect on the dysmenorrhea The patient's menses began at thirteen years of age recurred every thirty one days and lasted six to seven days There was a profuse flow during the first two days Dysmenorrhea was present after marriage as well as before

Physical examination revealed a very short thin individual who was 5 feet tall (when wearing high French heels) and who weighed only 89 pounds Her blood pressure was 90 mm systolic and 56 mm diastolic Her urine was negative The general physical examination revealed no abnormalities Abdominal examination showed nothing other than a well healed appendectomy scar Vaginal examination was made with difficulty because the patient complained of great pain even though the examination was made with only one finger in the vagina The latter was very tight due most likely to spasm of the levator ani muscles The cervix was long conical smooth and was high up behind the symphysis The corpus was slightly enlarged hard and deeply retroflexed The patient complained of much tenderness when an attempt was made to elevate the corpus The adnexa could not be felt because the patient was unco-operative

Since the patient came essentially because she wanted to have children I suggested that the husband's spermatozoa be examined first and if that were normal I would ante-flex the uterus and insert a pessary into the vagina If no pregnancy followed after a few months I would test the patency of the fallopian tubes

The patient did not follow my suggestion but returned on

November 19th saying that her last menstrual period had occurred on October 5th and although she had expected one on November 7th none appeared. She was extremely nervous and vomited every morning. Vaginal examination again was made under difficulty because of resistance on the part of the patient. A definite Chadwick sign was present but the cervix was not softened. The corpus was felt to the left of the mid line still retroflexed not larger than before and not softened. To the right of the uterus was a hard irregular mass the size of which could not be determined because when it was palpated the pain was so great that the patient almost jumped from the examination table. A tentative diagnosis of pregnancy and right ovarian cyst was made and the patient was asked to return in two weeks which she did. At this time (December 3d) she complained of much pain in the right iliac fossa. She weighed 90 pounds. A vaginal examination revealed both Chadwick and Goodell signs. The uterus was still retroflexed but softer and larger than before. The irregular mass on the right side appeared to be slightly larger and just as tender as at the last examination. The knee chest position was advised twice daily. The patient was told about the mass to the right of the uterus and I advised against an operation unless the mass grew rapidly or the pain became worse. The patient returned for another examination on December 19th at which time the uterus was anteflexed soft and the size of a seven to eight weeks pregnancy. The mass previously felt on the right side was much larger more irregular and lay behind the uterus filling the entire cul de sac and extending to the right side. It was more tender than before and the patient said she had a great deal of discomfort in the pelvis. A diagnosis of dermoid cyst of the right ovary was made and its removal advised because of the fairly rapid growth and pain.

On January 3d under ethylene gas anesthesia after preliminary administration of morphin and scopolamin I made a Pfannenstiel incision and removed a dermoid cyst of the right ovary which measured about 8 by 6 by 6 cm. The uterus was purplish soft anteflexed and enlarged to the size of a ten weeks

pregnancy Great difficulty was experienced in elevating the dermoid cyst from the culdesac because the pelvic cavity was very small and the pregnant uterus was in the way The dermoid cyst was adherent to the culdesac by a few thin adhesions which were easily severed The dermoid alone was removed and when opened showed hair and sebaceous material The left ovary was examined and found to be of normal size No corpus luteum could be seen protruding above the surface Before closing the abdomen the gall bladder was palpated because a competent internist had told the patient that she had gall bladder trouble However the gall bladder felt normal and contained no stones The patient was given a few hypodermics of morphin for two days following the operation After an entirely uneventful convalescence the patient left the hospital on January 16th which was thirteen days after the operation

Examination six weeks later revealed the uterus to be in good position and the size of a sixteen to eighteen weeks pregnancy There was no tenderness at all in the culdesac or in the fornices

Discussion—The first question which can be raised is the justification of the operation I believe the operation was indicated because of the pain which was at times almost unbearable but more particularly because of the rapid growth of the dermoid The latter apparently was quiescent until pregnancy began Since dermoids are fetal tissue perhaps the hormones of pregnancy which stimulated the growth of fetal tissue within the uterus also stimulated the growth of the dermoid

In our case the removal of the ovary containing the dermoid cyst at approximately the tenth week of pregnancy did not interrupt the gestation No corpus luteum was seen projecting above the surface in the left ovary but this does not mean that there may not have been a corpus luteum deeper in this ovary It does however signify that the corpus luteum of pregnancy was not of normal size because a corpus luteum of pregnancy is usually about 20 mm in diameter and such a mass can practically always be seen in an ovary of normal size Most likely in this case the corpus luteum of pregnancy reached its maximum growth at the sixth or eighth week of

pregnancy, and then retrogressed. Numerous sections of the ovary which contained the dermoid failed to show a corpus luteum. In fact, practically no ovarian tissue was found in the removed tumor except at the hilum. The entire ovary seemed to have been converted into a dermoid tumor. Even had the corpus luteum been removed, it is hardly likely that the pregnancy would have been interrupted for if the corpus luteum is removed after the eighth or tenth week of gestation there is practically no effect on the pregnancy. This is most likely due to the fact that by this time the placenta has taken over the function of maintaining the nidation of the ovum which function the corpus luteum possesses during the first few weeks of pregnancy.

While removal of the corpus luteum after the eighth or tenth week of pregnancy may not interrupt pregnancy an operation on the ovaries performed at a vulnerable time may cause an abortion whether or not the removed ovary contains the corpus luteum of pregnancy. This vulnerable period is the time a patient would menstruate if she were not pregnant. Hence when we decide to operate during pregnancy we should select if we can a time which would correspond with the intermenstrual period were the patient not pregnant. In our case the patient's menses would have occurred November 7th, December 9th, and January 11th. I operated on January 3d, which corresponds to the intermenstrual period.

Of the utmost consequence in the avoidance of interrupting pregnancy is the gentle manipulation of the uterus. The latter organ should be touched only when absolutely necessary and then with the utmost care. Squeezing and pulling the uterus favor abortion.

Another important factor in the prevention of abortion following an operation is the administration of sedatives like morphin and codein for a few days after the operation. This medication has a tendency to allay the irritability of the uterus.

In performing this operation on our patient I employed a Pfannenstiel incision, first, because it is much neater, and second, because there is much less likelihood of the development of a

the cyst was removed on December 19th. I suggested local anesthesia but the patient strenuously objected so ethylene was used. The patient's recovery was uneventful. She left the hospital on December 25th and all her symptoms disappeared almost miraculously. The pregnancy progressed normally and at the time of labor on February 21st I performed an extensive plastic operation on the perineum and rectocele. The puerperium was uncomplicated.

Discussion—Not much need be said concerning this case. The removal of the vaginal cyst was a minor operation which could not have any effect on the pregnancy. The only danger was that of infection but this did not occur. Why the removal of this cyst caused the sudden disappearance of all of the patient's symptoms is hard to say unless the effect on the psyche played an important part.

Case IV—Mrs W S a primipara aged thirty two came to see me on September 24th saying she had had her last menstrual period June 22d. From the point of view of our present discussion the only important finding was a friable bleeding polyp about 4 by 2 by 2 cm which projected from the cervical canal. The polyp was removed with a nasal tip cautery. There was no bleeding after this and the pregnancy continued to term. The child was delivered by low forceps and examination of the cervix showed no abnormalities. The puerperium was normal.

Case V—Mrs M G a primipara aged nineteen was first seen on March 17th when she was in her sixth month of pregnancy. Of interest to us was the fact that she had condylomata on the vulva in the vagina and on the cervix. Silk ligatures were placed around the condylomata on the vulva and in the vagina but those on the cervix were removed with the cautery. The pregnancy continued uninterrupted. Delivery was accomplished at term with low forceps and the puerperium was normal.

Discussion—Cases IV and V may be discussed together. At first glance it would seem that a cervical polyp is a harmless

thing and that the removal of a polyp would entail no difficulties or dangers. While this is essentially true in the non-pregnant state, it is nevertheless hazardous at times to remove a polyp during pregnancy. In support of this contention permit me to cite the following case reported by H. Heidler in the *Archiv für Gynäkologie* for 1924, vol. 121:

"In a thirty-one-year-old *tertipara* a cervical polyp was removed six weeks before delivery because of bleeding. No untoward results were noted after this. Six weeks later the membranes ruptured and labor pains began. Because of uterine asphyxia the child was delivered with forceps before there was complete dilatation of the cervix. The child, however, was born dead. Hemorrhage resulting from atony of the uterus necessitated manual removal of the placenta. The uterus contracted well after massage and drugs, but a short time later bleeding occurred again and the uterus was packed. Despite this the bleeding continued, so a quick abdominal hysterectomy was performed. A blood transfusion, saline solution and stimulants were given. The next day the patient had alarming symptoms and she died of a fulminating sepsis sixty-two and one-half hours after delivery. Autopsy showed a pyemia with metastases in the kidneys, in all the layers of the heart, a fibrinopurulent pleurisy, and fibrinous peritonitis. In the operative region, however, the reaction was slight.

"The only explanation for such an extensive pyemia was that there was some relationship to the polyp operation. Examination of the site from which the polyp had been removed revealed a small, purulent hematoma. The vessels around this showed septic thrombi which contained extracellular Gram-positive cocci."

The sequence of events in this case, according to Heidler, was as follows: "The polyp was probably infected before its removal, but infection may have occurred at its base after removal. At that time the purulent hematoma formed and likewise the venous thrombi. The author did not know of this infection, which was, therefore, a latent one. The instrumental delivery was the activator of the infection, although the labor

pains may have disseminated bacteria. The vaginal examinations and manipulations certainly played a part. The hemorrhage with its resulting anemia lowered the patient's resistance against the bacteria which were in the circulation. The author therefore strongly counsels against any manipulation of the cervix during pregnancy.

In both of my cases the puerperium was afebrile and undisturbed. In both cases the cervix after delivery appeared normal in every way.

Case VI—Mrs M G a primipara aged twenty two came to see me on October 30th complaining of persistent vaginal bleeding since October 3d. The September period had been five days late and had lasted ten days. Examination revealed a nulliparous outlet a soft lacerated eroded and bleeding cervix and a soft anteflexed uterus the size of a six weeks pregnancy. I checked the bleeding by cauterizing the cervix with a nasal tip cautery. During the following three weeks there was a profuse yellowish leukorrheal discharge but no bleeding. However when the cervix was touched it bled readily so a second cautery treatment was given. The uterus at this time was the size of a ten weeks pregnancy. The pregnancy continued without any complications other than occasional spells of bleeding from the cervix. I cauterized the cervix four times during pregnancy but each treatment was mild. On two occasions during pregnancy because of profuse bleeding I kept the patient in the hospital for a few days. On May 18th the patient went into labor. In spite of a long labor progress came to a standstill when the cervix was dilated only 8 cm. The baby's head was arrested with the sagittal suture running transversely and in spite of two doses of morphin and magnesium sulphate the patient was almost frantic with pain. I therefore made two incisions in the cervix and an episiotomy and delivered the baby by version and extraction. Following delivery I of course sutured the cervix and the episiotomy. After an uncomplicated convalescence both mother and baby left the hospital on the twelfth day in good condition. Examination

weeks after delivery revealed an excellent perineum a scar the right side of the cervix which was of normal size but a small hard anteverted uterus and normal adnexa. Examination showed the cervix to be red granular friable. A thorough cautery treatment was given. The patient said she had had a bloody discharge since leaving the hospital.

Discussion—This patient's cervical pathology first manifested itself during pregnancy. It most likely dated back a year and a half when the patient had a criminal abortion performed. The entire cervix was fiery red and bled when touched. Most or all of the difficulty in labor may have been due to the cervical pathology. Whether the mild cautery treatments were possible and if so how much is difficult to determine. In spite of the cautery applications during pregnancy the hemorrhagic condition of the cervix after labor was the same as before. However these treatments were very mild. Further but more extensive treatments with the cautery after labor cleared up the condition entirely.

Case VII—Mrs. H. R. a primipara aged twenty-two came to see me April 11th when she was five months pregnant. The only abnormalities found on physical examination were a large hemorrhoid and hemorrhoids. The patient did not complain of any trouble from the hemorrhoids until June 26th. At this time there was a great deal of pain and inability to move the bowels. Examination showed three large very tender hemorrhoidal masses all of which were markedly cyanotic and appeared necrotic. Palliative methods were of no avail so on June 3d under novocain anesthesia the hemorrhoids were opened, blood clots and necrotic material were removed. The patient remained in the hospital on the third day and has had no trouble with hemorrhoids since the operation. She was advised to take cod liver oil both night and morning for a number of weeks after the operation both because of the operation itself and the fact that she was markedly constipated. At full term on October 11th I delivered the patient with low forceps. During the

course of labor the hemorrhoids increased greatly in size. After the baby was born I replaced the piles and had to do the same thing a number of times during the puerperium.

When the patient returned for her final examination on December 18th only small hemorrhoidal tags were visible and nothing abnormal was felt on rectal examination.

Discussion—As was to be expected the small operation on the hemorrhoids had no effect on the pregnancy.

CLINIC OF DRS EDMUND ANDREWS AND R H JAFFE

RESEARCH AND EDUCATIONAL HOSPITALS UNIVERSITY OF ILLINOIS

INFLAMMATORY DISEASE OF THE DUODENUM SIMULATING CARCINOMA

THIS case, a patient thirty four years old entered the hospital January 29, 1926 complaining of pain in the stomach.

His family history was negative. His past history also was negative except for operation on the jaw bone when he was ten years old. His present trouble began in October of last year, four months ago with aching pains in the stomach which were fairly constant almost all day long. He had no pain before breakfast or at night. His pain did not begin until about 10 o'clock in the morning. The pain at first was relieved by food taking and alkalies, but of late these have had no effect and his pain, which is described more or less of the character of a heartburn, lasting without interruption from about 10 o'clock in the morning until he goes to sleep.

Early in December about two months ago he had a fainting spell, collapsed had violent pain in the abdomen which was lower down than before. He became distended the abdomen felt very heavy, and he complained of severe thirst. He did not, however, lose consciousness completely. He was however so weak that he had to be carried to a hospital and after arriving there vomited large clots of blood. He was in the hospital for about three weeks on ulcer management, at the end of which time his pain subsided and a gastro-intestinal x ray was made which he was told revealed the presence of ulcer of the duodenum. He followed out his dietary instructions for a few weeks and then went back to a more liberal diet. The pain

is now worse than it was before and as mentioned above is not relieved by alkalis or food taking. The history is otherwise negative.

Physical examination is likewise negative except for the abdomen which is extremely tender to touch in the upper portions especially on the right side. There is considerable muscle spasm and palpation is difficult. However the liver is not palpable and the pain seems to be distinctly lower than the gall bladder.

Laboratory Findings Pulse, temperature, and respirations normal. Coagulation time five minutes. White blood count 8600 urine negative. E. W. L. shows 46 free and 63 total acidity. No blood. The stool have persistently contained large amounts of chemical blood. There are however no tarry, and since the patient has been in the hospital he has not vomited any blood.

The x-ray shows a persistent and extreme deformity of the duodenal cap on several examinations. The emptying time is only slightly delayed and there is not the usual amount of hyperperistalsis of the stomach which one sees in the duodenal ulcer. The outline of the stomach appears to be entirely normal.

Diagnosis in this case presents certain interesting problems. At first glance the assumption appears warranted that we are dealing with a duodenal ulcer. However, there are certain features of this condition which render this doubtful. Let us examine the evidence on both sides. Here we have a man who had gastric hemorrhages and persistent blood in the stools with a ray deformity of the duodenum with high acidity and with a history in the early stages of the condition was typical of the chemical type of pain. However as the case stands now there are certain features which militate against this diagnosis. Of late his pain has not had any food relations. It has not been relieved by alkalis or by food taking. It does not respond even temporarily to ulcer management. Of course it is well known that patients with gastroduodenal ulceration who are subject to large hemorrhages often present very atypical ulcer history. They are however, somewhat more inclined

to be pain free between the big hemorrhages. Several years ago I had the privilege of working with Dr Sippy. He made it a point to accentuate these slight deviations from ulcer histories, and always said that such a history was suggestive of carcinoma. A case that changes from the typical ulcer sort of heartburn to that of continuous pain which is not relieved by food or alkalis at once makes us suspicious of the presence of carcinoma. Again, a case with an obvious proved ulcer such as we are dealing with here, which is not relieved even temporarily by the Sippy management, means one of several things:

- 1 That we are dealing with a case in which there is such a scarring and induration about the pylorus that the stomach cannot empty itself. x-Ray in this patient proves that that is not the case. The stomach does empty.
- 2 Many cases of duodenal ulceration have a markedly hypersecretion of the stomach aside from the times of food taking. Such cases usually vomit large amounts of watery, high acid material and they may not be relieved by ulcer management. This patient seldom vomits and aspiration of the starving stomach shows no continuous secretion.
- 3 The development of a malignancy in an old ulceration is often heralded by this syndrome and in the cases in which I have made the diagnosis earliest of ulceration about the pylorus the indications for operation have been of the sort here described.
- 4 A penetration of the ulcer with the development of an inflammatory mass may bring about this change in the stomach symptomatology.

Therefore before we operate we will state our diagnosis as follows: That it is an evident duodenal ulcer. We suspect, however, that we may encounter carcinomatous changes in a saddle type ulcer or a mass of inflammatory tissue.

Operation.—As soon as the abdomen is opened it is evident that our fears of carcinoma were justified. Studded over the entire peritoneum very thickly are small whitish flecks. These can be seen on the stomach, liver, coils of intestines and the anterior abdominal walls. They vary in size from 1 to 5 mm in diameter. They are elevated and hard. Seminated nodules may be either metastatic carcinoma and

as we are dealing with a stomach disease and not a bowel disease they are most certainly not tubercles. There is no free fluid in the abdomen. As the stomach is brought out it is seen that the duodenum is rather bound down and difficult to get access to. The pylorus however is normal and easily patent to the finger invaginating the walls. In the duodenum is a mass about the size of a walnut which is firmly adherent to the right posterior wall. This mass appears to be entirely confined to the interior of the bowel and the serous coat as far as I can find shows no pathology. It is a question whether exploration of this tumor further is warranted. There are no glands. The pancreas appears normal and the tumor lies about 2 inches from the pylorus and on the opposite quadrant of the duodenum from the bile ducts. It is most certainly not a carcinoma of the ampulla of Vater which is the usual seat of malignancy in the duodenum. I would like very much to get a specimen for microscopic examination of the tumor but that would be impossible without an intraduodenal exploration which I do not feel is warranted because it is so easy to remove some of these little nodules from the peritoneum and examine them. I can put my finger in the foramen of Winslow which is widely open and find these little seeded nodules in the inside of the lesser peritoneal cavity. Since this mass is obviously inoperable I am going to simply make a gastro enterostomy. This we do in the three-layer manner according to the original Billroth technic. I have always used this method which may take up a little more time than the Connell or the two layer methods but is exceedingly safe against leakage. As we are dealing with a carcinoma I am going to use silk throughout in all the layers. The wound is closed in the usual manner.

The patient made an uneventful recovery.

The Pathologic Report and Discussion by Dr R H Jaffe —
The specimen is a piece of intestinal wall showing several layers of muscle fibers subserosa and serosa. The subserosa is thickened and consists of loose fibrillar connective tissue. Between the fibers there are scattered small accumulations of polymorphonuclear leukocytes and a few macrophages containing hemo-

siderin. The lymph vessels are distended and show a swelling of their endothelium.

Near the free surface a number of spherical nodules is found. They are sharply demarcated from the surrounding tissue and measure from 0.1 to 0.3 mm in diameter. As to the histologic structure three different types of nodules can be distinguished. The first type is composed of oval and round cells which are enclosed in a capsule of thin connective tissue fibers. Single fibers also extend between the cells forming a loose and delicate



Fig. 325

network. The oval cells have pale nuclei. The nuclei of the round cells stain deeply. There are a few free chromatin granules. Second, there are nodules which have a homogeneous center that stains a pale red with eosin and deeply blue with Mallory's aniline blue method. This center is surrounded by spindle shaped cells. In the third type of nodules a tortuous and homogeneous band stands out very distinctly. It appears bright blue in the Mallory sections. In the center a number of endothelioid cells are present, while to the outer border of this band spindle shaped and round cells are attached.

The three forms of nodules are connected with each other by transitional stages. It seems that they are derived from lymph vessels. First the endothelial cells proliferate, while the wall becomes transformed to a hyaline band. Young connective tissue surrounds this band which gradually clumps together to a homogeneous center. Migrating cells break into the hyaline center and replace it. Thus a cellular nodule results which consists of connective tissue cells and a few lymphocytes.

It is very evident from this report that the operative diagnosis was wrong at least as far as the secondary nodules were concerned and therefore in all likelihood the tumor in the duodenum was not a malignant one but simply inflammatory. The cause of such a condition opens many possibilities. Certain cases have been reported in which a similar gross picture appeared due to the dissemination and encapsulation of numerous fine foreign bodies in the peritoneal sac. However in those nodules excised in this case no foreign bodies were demonstrated. The irritation which may arise from the presence of a malignant tumor very frequently gives rise to metastatic changes in lymph glands which are purely hyperplasia or inflammatory reactions due to secondary infections. This is especially true of lymph glands draining the gastro intestinal tract, in which it is notorious that most of the lymph glands of gastro intestinal carcinomas if examined histologically will not show any carcinoma. It has been stated that 60 per cent of carcinomas of the bowel die without any secondary carcinomatous invasions of other organs and it is well known that if large numbers of lymph glands are dissected at autopsies in the cases dying of carcinomas of gastro intestinal tract and each lymph gland examined histologically that only a small minority of them will contain secondary tumors. Whether these changes in the peritoneum are paralleled by such a pathology in the lymphatic system is another question. The most obvious parallel of the pathology seen in this case is that of Zuckergussleber, in which there is a thickening and production of whitish scar tissue not only in the peritoneum covering the liver but also in that of the diaphragm and some of the adjacent organs. Possibly we are

dealing with the earliest possible stage of such a condition as this. However, the fact that these nodules were found scattered over the small intestine militates against this view, as in Zuckergussleber the small bowel is not involved in the process. Such incidents as here reported probably are the cause of a great many of the so-called cures of cancer. To all intents and purposes one would have felt justified in swearing that we are dealing with a cancer in this case.

DR. ANDREWS: The operative findings were so typical in every respect that the importance of a histologic confirmation of all suspected tumors cannot be overemphasized.

Whether this mass in the duodenum was malignant or not time only can tell. Carcinomas of the duodenum are not so rare as we used to believe. I have seen 1 case which was confirmed histologically and 2 others in which I am quite sure that carcinoma originated in the duodenum itself. Fifteen cases of primary carcinoma were reported recently from the Mayo Clinic, so on the theory of probabilities we cannot rule out carcinoma here in spite of these very interesting laboratory findings. However, the patient's subsequent history certainly tends to confirm the view of Dr. Jaffe.

Subsequent History.—The patient was seen ten months after his operation. He had gained 35 pounds in weight. He now has no gastro-intestinal symptoms of any sort, and examination failed to reveal the presence of ascites or tumors in the abdomen, nor was there any lymphatic involvement in any other part of the body, so I believe we are justified in concluding that the case here reported was an inflammatory mass in the duodenum.

CLINIC OF DR EDWARD IYMAN CORNELL

CHICAGO LYING-IN HOSPITAL

THE MANAGEMENT OF HEART CASES IN PREGNANCY AND LABOR

THIS morning we have a heart case who is about to deliver. We will watch the result of the management in this case and then discuss several other patients recently seen.

Case I.—The first patient, Mrs. B. No. 53 561, age eighteen years, para III, was admitted to the hospital on November 20th complaining of dyspnea and palpitation of the heart. Her family history is negative. She has had measles, whooping-cough, chorea, and diphtheria. Her tonsils have been removed.

Her first delivery (in 1923) was normal in every respect, labor lasting nine hours. She was in bed for eight days. She had a spontaneous six weeks' abortion in 1926, followed by a curettage. Her last menstrual period was April 5th. The quickening date is unknown. The term date is January 12th. The cause of her present disturbance is unknown.

Physical examination November 20th revealed the blood-pressure 125/60, pulse 90, two decayed teeth, an enlarged thyroid, and rather marked choreiform movements. The heart was enlarged to the left. There was a palpable presystolic thrill at the apex, presystolic, systolic, and diastolic apical murmurs, and an accentuation of the pulmonic second sound. Numerous persistent moist râles were heard at the bases of both lungs. There was slight digital cyanosis. The diagnosis was "chorea," chronic endocarditis (mitral stenosis and regurgitation), with partial decompensation.

Under rest in bed and tincture of digitalis 1 dram every six hours for twenty four hours then 20 minims three times a day the patient quickly recovered. She was discharged from the hospital at her own request on November 26th at which time her temperature was 98° F pulse 78 respiration 18 and general condition greatly improved.

On January 18th the patient re entered the hospital complaining of a pounding sensation in the region of the heart and a feeling of fulness in the throat. She was again placed in bed and given tincture of digitalis 20 minims three times a day. There was moderate digital cyanosis but the choreiform movements were less marked. On the 21st it was deemed advisable to bring on labor as the patient was nine days overdue.

One ounce of castor oil and 5 grains of quinin were given her with good results. Pains began at 10 P M January 21st. They were irregular and of slight significance. At 2 A M she had 1.5 cm dilatation and slight pains at ten minute interval. At 6 A M she began to have strong three minute pains. At 6:30 $\frac{1}{2}$ grain of morphin was given and the pains were controlled until 9:20 when the Gwathmey rectal instillation was given. At 9:55 the head was on the perineum. At 10:12 the baby was being delivered rapidly and spontaneously with very little effort on the part of the patient. She was oblivious to what was going on about her. Even so we asked the intern to give ether to the obstetric degree in order to prevent her from making any effort to expel the child. To control the hemorrhage in the third stage of labor $\frac{1}{2}$ c c of pituitrin was injected and the placenta was delivered ten minutes later. She lost 325 c c of blood. Her pulse at the time of delivery was 110 temperature 99.7° F.

We would ordinarily not give Gwathmey's rectal instillation to a multiparous patient who was so near delivery. In this case however we wished to prevent the patient from bearing down and as the perineum and vaginal structures were so relaxed we felt it was easier for the patient to allow the uterine contractions to deliver the child. We have found that small doses of ether such as used in the rectal instillation act as a

heart stimulant. Again when given per rectum it does not seem to produce the bronchitis so often seen when giving ether by inhalation.

After history—The patient made a very nice recovery following the delivery the pulse rate gradually coming down until it reached 72. She left the hospital on the ninth day much against the advice of the medical staff. At the time of discharge she had good cardiac compensation although she was somewhat weak. One month after leaving the hospital the patient was seen at the heart clinic. Her general condition was good and the heart well compensated.

We have recently had a series of heart cases and I wish briefly to give you a resume of the cases the management and the reasons for so handling them.¹

Case II—The second patient is Mr. R. No. 53217 who entered the hospital on November 21st. She was a primipara aged twenty one. Family history was negative. Patient was cyanotic at birth a blue baby and was always rather frail. At six years of age she had an attack of rheumatism. On admission she complained of nausea and vomiting epigastric pain with dyspnea and an annoying palpitation of the heart. Her last menstrual period was April 14th and she was due January 21st.

On examination the heart findings were as follows. Having apical impulse in fifth intercostal space long presystolic and short late systolic murmurs at apex loud systolic at base and accentuation of pulmonic second sound. There was no apparent enlargement to the left but quite marked to the right of the sternum. A slight general cyanosis was present but no physical evidence of decompensation though the pulse rate was greatly increased.

A Ray and fluoroscopic examination revealed a peculiar abnormality of the auricles.

Diagnosis (1) Congenital heart (2) subacute rheumatic endocarditis.

Only the essential features in the histories will be mentioned because of lack of space.

The uterus was the size of a six months pregnancy

She was placed in bed under the care of the internist and put on digitalis medication. For the first eleven days her temperature varied from 98° to 100.8° F and pulse rate from 100 to 130. There was a trace of albumin in the urine. Blood pressure was 78/40, gradually increasing until on December 1st it registered 120/60. On December 8th while still in bed she had an attack of tachycardia the pulse rate being 148 and of poor quality. The heart dulness became wider in area and more to the right than to the left. She was given morphin $\frac{1}{4}$ grain, 2 ampules of digalen and an ice bag was applied to the cardiac region. On the 9th she rested comfortably the pulse rate being 104 and of fair volume the blood pressure 98/50. The heart gradually improved under tincture of digitalis 20 minims three times a day the blood pressure slowly picking up until on December 29th it was 102/50. She had no complaints and was resting quietly in bed. She was kept in bed throughout the entire period of her stay in the hospital because the slightest exertion on her part caused a tachycardia.

On January 8th at 11:30 P. M. the bag of waters ruptured. The patient was immediately taken to the delivery floor. At 2:45 A. M. January 9th she complained of a few irregular pains. Temperature was 97.6° F and pulse rate 88. In the early evening (January 9th) she complained of irregular pains which were becoming a little more pronounced. At 11 P. M. $\frac{1}{4}$ grain of morphin and 1 ampule of digalen were given. At 2 A. M. January 10th the patient had 8.5 cm dilatation. The uterine contractions were not felt by the patient. She was watched constantly and at 3:10 A. M. the baby was born spontaneously precipitate. The delivery was absolutely painless until the last ten minutes when the patient aroused somewhat from the morphin anesthesia. The placenta was delivered at 3:20 by early expression after 1 cc of obstetric pituitrin had been given. The patient lost 250 cc of blood. The baby weighed 2050 grams.

We felt in this case that it was advisable to let the patient have the test of labor because the baby was small she was a

young woman, and because labor continued nicely under morphin and the patient remained quiet.

After-history.—The patient ran a practically normal course except for a temperature of 101° F on the fifth and sixth days, which was due to foul lochia. On ergot, 15 minims, and hydrastis, 15 minims, three times a day, she made a prompt recovery. The pulse rate on leaving the delivery room was 126, at noon it was 88, and the following morning 72. It varied between 80 and 100 until the seventh day, when it averaged between 80 and 90.

Follow-up.—She was discharged on the seventeenth day, January 27th, in excellent condition except for some irritability of the heart. The baby was in excellent condition. This patient has been seen frequently at the heart clinic since discharge from the hospital. She is gradually improving. The tachycardia and cyanosis are still present. She is stronger and tires less easily. She is not nursing or caring for the baby.

Case III.—The third patient, Mrs. E., No. 54,652, came under observation for the first time in the prenatal clinic on July 9th. She was twenty-three years old and a para II. The first delivery by forceps occurred in 1925, the baby weighing 5½ pounds. Her family history was negative. Her past history showed nothing of importance except scarlet fever in childhood. Her last menstrual period was on April 14th and she was due January 21st. The quickening date was not known.

On examination July 9th the heart was found to be enlarged to the left; there were short presystolic and long, loud systolic murmurs at apex and a short faint diastolic murmur in the third left interspace close to sternum. The radial pulse was quick and high and the pulse pressure was moderately increased. There was no evidence of heart failure. The diagnosis was double mitral endocarditis with relative aortic insufficiency.

The blood-pressure through the prenatal observation was somewhat elevated, the highest being 140/70 in August. Thereafter it ranged between 126 and 132 for the systolic. The patient felt well throughout the prenatal period, reporting at

regular intervals. She entered the hospital on January 18th in labor with the cervix fully dilated. The baby was born before the nurse had an opportunity to prepare the patient properly. The placenta was born ten minutes later spontaneously. The baby weighed 2950 grams.

The pulse rate on admission was 68, temperature 97° F. The pulse rate after delivery was 80 and temperature 98° F. This patient made a very rapid recovery, the only complaint she had being that the odor of food caused nausea. She vomited on several occasions until the 22d when her stomach was washed out and about 100 c c of bile stained fluid recovered. Thereafter the vomiting ceased, probably because of the discomfort caused by the stomach tube. The patient was extremely nervous but aside from that the pulse rate never ranged higher than 80 after the second day.

This patient was advised to enter the hospital one week before the expected date but her intelligence and co-operation were such that we could expect little from her. What I wish to call your attention to in this case is that this patient had a double mitral lesion and aortic regurgitation and yet went through her delivery with apparently little disturbance.

After history—She was discharged on January 27th in excellent condition. This patient has not reported back to the heart clinic.

Follow up—The patient returned March 23, 1927. She was in excellent condition nursing the baby and caring for it.

Case IV—The fourth patient Mrs. M. No. 54415 was admitted to the hospital on September 11th complaining of dyspnea on slight exertion. She was nineteen years old, para I with a negative family history. She had had osteomalacia at six years of age. One sister has a mitral stenosis. This sister had an anemic psychosis in her first pregnancy.

She first came to the clinic on August 3d at which time the obstetrician found a murmur in the mitral area. She was referred to the heart clinic but did not get there until September 7th at which time she was advised to enter the hospital.

There was a thrill felt over the precordial area and a crescendo thrill with an accentuated first sound and a rough second sound at the apex. The heart was enlarged to the right. There were presystolic, systolic and diastolic murmurs at the apex and the pulmonic second sound was accentuated. There was rather marked pulmonary edema, edema of lower extremities, moderate cyanosis of lips and fingers. Orthopnea was extreme. **Diagnosis** Double mitral endocarditis with decompensation.

The blood pressure was 96/58. The patient was put on digitalis 20 minims three times a day. On September 14th the dose was reduced to 15 minims. She was discharged at her own request on September 16th, the symptoms having cleared up considerably. On October 19th the blood pressure was 110/68. She still had dyspnea and some cough and the pulse was 120. She was advised to return to the hospital but refused. On November 2d she returned. The dyspnea was more marked, she had considerable edema of the legs and ankles. This time she consented to enter the hospital and was placed at absolute rest flat on her back, and the digitalis reordered in larger dose.

As soon as she improved she insisted on going home. She was discharged on November 10th. She was readmitted to the hospital on December 6th at which time the heart border was found 3 cm beyond the left nipple line. There was some edema. The patient had some dyspnea. She remained in the hospital for five days when she again insisted on going home. She returned on January 5th, complaining of dyspnea. The heart action was regular and very strong. She also complained of some slight abdominal cramps. Blood pressure was 104/60. The pelvic measurements were Sp I, 25.5 Cr T 27 Bi troch 31, Baud 17.5, C D 11.

As she was rather unruly and had had several attacks of mild decompensation it was decided to empty the uterus as soon as we felt that the child would have a good opportunity of living. We decided it would be wiser to do this than to wait for her to go into labor spontaneously. The internist felt that the heart reserve in this particular patient was so low that it would be advisable not to allow her to enter labor in spite of

the fact that on many occasions we had had some wonderful results in giving the heart cases the test of labor

A laparotrachelotomy was performed under local anesthesia. One half hour before operation she was given $\frac{1}{4}$ grain of morphin and 1 200 gr of scopolamin. The pulse rate at the time of operation was 100 blood pressure 104/70 and the heart was well compensated. She behaved very well during the operation. A small amount of ethylene was given at the time of the delivery of the baby. After operation she was given digalen 1 ampule three times a day for two days and thereafter the tincture of digitalis 20 minims was administered for the first ten days. The pulse rate immediately after operation was 140. It gradually came down so that by the sixth day it was 100 and the fourteenth day it averaged 80.

After history—She was discharged on January 26th in good condition. She has not reported to the clinic but through a relative we have learned that she is in good condition (March 15th).

Case V—The fifth patient Mrs N No 54242 entered the hospital January 7th. She was forty two years old para VIII due the first part of February. She was admitted to the prenatal clinic on November 17 1926. Her family history was significant. Her mother died of paralysis having also had heart disease. One sister had heart disease. The patient had a gall bladder operation in 1925. She had influenza on three different occasions. She had had seven normal deliveries and puerperiums. At the time she was admitted to the prenatal clinic she complained of headache epigastric pain frequent urinations and occasional dizziness.

Examination at that time revealed a very thin patient with *opacities of both eyes so that she was nearly blind*. The heart was markedly enlarged and gave all the evidences of a moderate grade myocarditis. Blood pressure was 150/80. The urine was negative. x Ray revealed a dense generalized fibrosis of both lungs.

Because of the continued marked dyspnea the eye

turbances, and increasing blood pressure the patient was placed in the hospital for observation. On admission the blood pressure was 170/90 temperature 97° F, pulse 102, respirations 26. The respirations gradually increased in rate until the 24th the highest rate being 38. She was placed on digitals 15 minims three times a day. The blood pressure gradually receded until December 8th, when it was 108/70 with only one day in which it increased to 158 diastolic. The dyspnea was not noticeable so long as she remained quiet, but on the slightest exertion it returned. The eyes cleared up so that she was able to see the headlines of the newspaper. Eye examination on December 14th showed an albuminuric retinitis of long standing.

She gradually improved during her stay in the hospital until January 1st, when she again complained of shortness of breath. The dyspnea gradually increased and the blood pressure rose to 150 diastolic and the pulse to 140 so that on January 7th it was decided to induce labor.

A 7 cm bag was placed in the uterus at 12 10 P M and at 9 30 P M the bag came out spontaneously. The pains ceased thereafter. The following morning the baby was delivered by a vaginal cesarean section, the cervix having contracted again to 3 cm. The blood pressure at the time of operation was 150/80 and pulse 140. The operation was started with local anesthesia, but the patient became quite restless, so that it was finished under ethylene. The baby weighed 2045 grams. It lived for two hours and died of atelectasis.

One hour after delivery the patient's pulse was 118, respiration 48 and temperature 98.4° F. She made a very nice recovery, but the pulse rate ranged around 120 throughout the puerperium. She left the hospital on January 20th, the twelfth day after operation, at her own request. She has not reported back to the clinic.

Case VI—The sixth patient, Mrs. S., No. 53,906, was admitted to the hospital on December 8th. She was thirty years old para IV. She first appeared at the prenatal clinic on October 11th at which time it was found that she had a mitral

regurgitation and a toxic thyroid. Her family history was negative. She had had no previous illnesses with the exception of scarlet fever in childhood. She had had two normal spontaneous deliveries with normal recoveries and one miscarriage at two months. Her last menstrual period was March 22d and she was due on December 29th. The origin of the heart lesion was unknown.

The blood pressure at her first visit was 122/68. At the time of admission to the hospital she complained of some dyspnea and slight edema of the legs. The urine was negative and the blood pressure 118/64. The pulse was 98 and temperature 98.4° F. She was placed in bed for five days under digitalis therapy during which time the dyspnea and edema disappeared. She was pale and a blood count showed 65 per cent hemoglobin, 4,100,000 red blood cells and 12,800 white cells.

Because of the mitral regurgitation with beginning evidence of broken compensation and the toxic thyroid it was deemed advisable to induce labor. This was done by means of a bougie and a No. 16 F catheter. The patient went into labor in the early evening of December 13th. The pains were irregular but at 1:40 A. M. they became stronger and at intervals of two to three minutes. The patient delivered spontaneously at 3:1 A. M. the placenta being born at 3:17 by early expression. During the second stage the patient was given ether to the obstetric degree. One hour after delivery temperature was 99.7° F, pulse 80.

After history—The patient was discharged on the tenth at her own request. The heart was fully compensated, baby was in good condition.

Follow up—The patient reported February 2, 1921, was in good condition, heart compensated. She was the baby.

Case VII—The seventh patient, Mrs. S., No. 53, entered the hospital on December 11th. She was twenty years old, para I. She was due the early part of January. definite history could be obtained as to the date of

Chicago Lying in Hospital staff) In general, these patients should be treated primarily as heart cases. The obstetric condition should be considered as a complication of the heart. Bearing this in mind, one should never attempt delivery in a decompensated patient for two reasons. First, a patient who is very sick will often go into premature labor and deliver herself with little trouble and exertion. Second, if nature does not start labor, the chances are favorable that we can improve the heart to the point where it is safe to induce labor.

In patients with no obstetric complication, such as contracted pelvis etc., it is best to deliver from below. We should do everything in our power to ease the second stage of labor, using morphin rather liberally, Gwathmey's rectal anesthesia etc. Less operative interference, except low forceps, should be employed. In the last part of the second stage ethylene or ether may be used, chloroform and nitrous oxid never. We have found ethylene efficient in tachycardia, the pulse being slowed considerably.

If cesarean section is employed it should be done under local anesthesia, using ethylene if necessary in delivering the baby. We use cesarean section chiefly in the following class of heart cases. Contracted pelvis elderly primiparæ with large babies, patients with long undilated, tough cervixes primiparæ who have had several attacks of broken compensation and who are near term.

In spite of all precautions every once in a while a patient dies

CLINIC OF DR. EDWIN W. RYERSON

ST. LUKE'S HOSPITAL

UNUNITED FRACTURES

IN order to illustrate some of the difficulties in the treatment of ununited fractures, I will present the records of 3 rather unusual cases.

Case I.—N. P., a man of twenty-eight, sustained a fracture at the middle of the left humerus in an automobile accident on July 4, 1915. A surgeon in Indiana applied a metallic splint, but in seven weeks no union was found. A Chicago surgeon then operated at the Alexian Brothers' Hospital, using what apparently was an Eecke and Brougham beef-bone plate attached by four beef-bone screws, although the patient said it was a silver plate. The x-ray plate which he brought is shown in Fig. 326, 1. The wound suppurated for three months, when the plate and screws were removed and the bone was "scraped."

On December 31, 1915 the same surgeon again operated, using an Albee autogenous inlay bone-graft taken from the left tibia, and tied in place by kangaroo tendon. The wound in the arm healed by first intention, but the fracture failed to unite. The wound in the leg suppurated and discharged pieces of bone for a year.

In April, 1917, almost two years after the original injury, the patient came to my clinic. There was no attempt at union, although the bone ends were overlapping $1\frac{1}{2}$ inches, and were in close contact. A plaster-of-Paris jacket was made, including the arm and forearm as well as the body, in order to afford good fixation of the humerus. A large window was cut out over

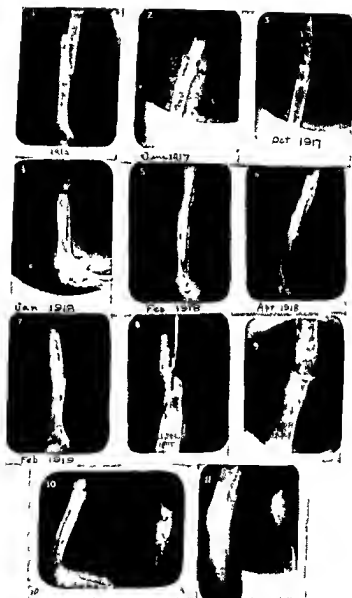


Fig. 326—Case I 1 Showing result in 1915 after application of beef bone plate and screws. First operation. Non union. 2 Two months later. Third operation. Inlay bone graft. Shown in plaster cast. 3 February 1917. Non union. Upper end of graft united, lower end loose. 4 February 1918, one month after intramedullary graft. 5 February, 1919.

the area of the fracture, and the following operation was carried out through this window, without removing the cast.

The former incision was reopened, and the musculospiral (radial) nerve was identified, freed up, and retracted. The bone-ends were resected $\frac{3}{8}$ inch, and the medullary cavity reamed

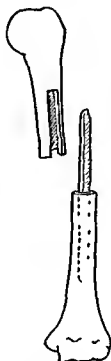


Fig. 327—Case I. Method of inserting intramedullary graft. Picture shows graft considerably shorter than it actually was.

out. A $3\frac{1}{2}$ inch autogenous bone inlay graft was inserted by the Albee technic, using the Hoglund motor twin saw and tying the graft in place with kangaroo tendon. No infection occurred, and two months later the x-ray showed excellent approximation (Fig. 326-2), but in October, six months after operation it

after intramedullary graft. 6 April 1918 four months after intramedullary graft. 7 February 1919 showing solid union. Case II. 8 July 24 1917 immediately after first operation bone graft. Non union. Intervening pictures have been lost including an Albee inlay graft and a long intramedullary autogenous graft. 9 January 7 1920 two months after short mortise operation and iron wire. 10 June 10 1920 union fairly solid. 11 November 19 1920 solid union. Has been at work two months.

was evident that failure had again resulted. The upper end of the graft was firmly united to the upper fragment but the lower end played loosely in the slot in the lower fragment (Fig 326 3).

In December 1917 the fracture was again exposed as before. A long graft nearly 8 inches in length was cut from the tibia and driven into the lower fragment as far as it would go. In order to get it into the upper fragment a slot was cut 2 or 3 inches upward from the fracture the arm pulled downward strongly and the graft engaged in the slot. When the pull was relaxed the graft slid up into the humerus and the bone ends came accurately together (Fig 327). The arm seemed perfectly solid. A plaster cast was applied and was removed on February 6th when good union was present. Figures 326 4 5 6 show the progress and Fig 326 7 one year after operation shows complete bony fusion. The man was seen one year ago and had had no further trouble with the arm.

Summary—Young man with fracture of humerus no union in seven weeks (1) plate screwed on. Infection (2) Plate removed (3) Albee inlay graft. Non union (4) Another Albee inlay graft fifteen months later again no union (5) Long intramedullary autogenous graft produces rapid and perfect union.

Case II—Ununited Fracture of Humerus—F. H. man fifty three years old fractured the middle of the left humerus in 1916. Conservative treatment resulted in *non union* and in May 1917 a rather short Albee autogenous inlay graft was applied by a Rockford surgeon. No union resulted and on July 24 1917 I exposed the fracture and found the graft united to the lower fragment but playing loosely in the slot in the upper fragment. (The reverse of Case I Fig 326 8). The graft was removed and the slots were lengthened to 3 inches apiece and a 6 inch tibial graft inserted. Two holes were bored in the upper segment and one in the lower going through the graft and the cortex of the humerus. Screw threads were cut in the holes by a machinist's tap and beef bone screws

were screwed in. These seemed to hold the graft very firmly, but two chromic catgut ligatures were tied around the bone for additional security. A body-and arm cast had been previously applied, and the operation was performed through a window, as in Case I.

Seven months later the arm seemed quite strong, but in June, 1918 non-union was again evident. Accordingly, on July 5, 1918, another operation was performed. The success of the intramedullary splint in Case I prompted me to use the same method, and a similar technic was carried out. For nearly a year the arm seemed solid but gradually the splint became



Fig 328

absorbed and a typical pseudo-arthritis resulted. The pictures taken after the last two operations have been lost.

At this time the man's insurance company became pessimistic, and settled with him on the basis of a lost arm. In spite of my two failures he came to me again.

On November 6, 1919 I performed a short, overlapping double mortise (Fig. 328) operation drilling the bones and wiring them together with iron stove wire (much better than silver wire for all purposes where wire is needed—Fig. 326, 9). By June, 1920 union was firm, and two months later he returned to work with no disability whatever (Fig. 326, 10, 11).

Summary—Ununited fracture of humerus

1 Albee inlay autogenous graft Non union

2 Another similar graft but longer and stronger and screwed firmly in place with beef bone screws Non union

3 Long autogenous intramedullary graft Non union

4 Short overlapping double mortise wired Solid union still united seven years later wire still in place

Why should the intramedullary graft fail in this case after scoring such a brilliant success in the previous case? The technic was identical and both cases had had two Albee inlays which failed so that any reduction of osteogenetic ability due to surgical interference would have been approximately equal.

The only real difference would seem to lie in the ages of the two men one being in the twenties and the other in the forties. It is well known of course that age does play an important part in osteogenesis and yet the older man made a perfect union after the bones had been mortised and wound with wire. I have no solution for this seeming inconsistency.

Case III—Fracture of Forearm, Both Bones—R. B. a woman of about forty sustained a fracture at the middle of the left radius and ulna on August 22, 1923. The overriding was reduced by open operation and the bones were adjusted accurately without the use of any internal fixation by a Wisconsin surgeon one week after the accident. No union occurred. On November 3, 1923, he again operated using silver wire. This was unsuccessful and a third operation was performed on January 5, 1925, more than a year later, two short autogenous intramedullary bone pegs being introduced. The wounds healed promptly but no union resulted.

She was then referred to me and on September 25, 1925, I exposed nearly the entire length of the radius. The fractured ends were an inch apart, separated by fibrous tissue. The lateral surface of the radius was chiseled off, making a flat surface of raw bone about $2\frac{1}{2}$ inches long on each side of the fracture. A 6 inch graft $\frac{1}{2}$ inch wide was cut from the tibia and flattened upon the medullary side. A hole was drilled in

each end and screw threads were cut with the tap. Similar holes were cut and tapped in the radius to correspond and the massive bone graft was then screwed to the radius with ivory screws (Magnuson's). Ligatures were tied around bones and graft in several places. Many small osteoperiosteal grafts were placed around the fractured ends. The ulnar fracture was now exposed, the fibrous ends resected a short distance and the bone ends were split with a chisel lengthwise and splintered a little to favor callus production. Three small osteoperiosteal grafts were laid around the fracture. No large bone graft was used as too much time had already been consumed. The wounds were sutured and a plaster cast was applied.

December 4th, nine weeks later, the x-ray showed good union of the massive graft to the radius and no union of the ulna. In January the radial graft was firmly united and the arm felt solid. Two weeks later while on a train to California the radial graft broke although a light splint was being worn at the time. The patient was seen by Dr. J. C. Wilson of Los Angeles who immobilized the arm in a plaster cast. Three months later no union of the graft had occurred and it was decided to perform the fifth operation (Fig. 329 A).

On June 7, 1926 the radius was again exposed freely, the ivory screws removed and the bone was freshened and flattened beside the old fractured graft which was left in place. The left tibia was exposed through a long incision and practically the entire shaft was removed leaving only the two extremities. The periosteum was disturbed as little as possible but where the muscles were attached there was of course no periosteal covering. The tibia was cut across the middle into two equal lengths of about 4¹/₂ inches each and one side of each piece was flattened with a coarse rasp. This surface was then laid upon the prepared side of the radius and tied to the two radial fragments by four chromic catgut ligatures. No other fixation was used. The ulna was then exposed and freshened and the other piece of tibia was similarly rasped flat and tied by ligatures. The incisions were sutured and a cast was applied from wrist to finger. No infection occurred and in three months the fibular

graft would seem to be the most logical and scientific method and I have used it with success in many cases but it failed four times in 2 of the cases here reported The 'massive' graft screwed in also failed The full size fibula graft actually somewhat larger than the ulna to which it was attached rapidly united to its hosts both radius and ulna It seems to me that these two large grafts remained alive although I have no means of proving my contention

CLINIC OF DR DANIEL N EISENDRATH

MICHAEL REESE HOSPITAL

POSTOPERATIVE COMPLICATIONS IN UROLOGY

In our previous clinics we have presented and operated cases illustrating various lesions of the urinary tract in both sexes and the genital tract in the male. We have discussed the preoperative diagnosis and care, indications for and technic of operative procedures, etc. At today's clinic I propose to take up the question of postoperative complications and to show how by adequate instruction to our resident medical and nursing staff many a disaster can be avoided. In other words we can divide postoperative complications into two principal groups:

(a) Those which are unavoidable

(b) Those which are avoidable or can be greatly minimized in severity

I do not desire to take up in detail every possible complication which could be assigned to each of these groups. Many will either be simply mentioned or discussed very briefly. A few will be illustrated by cases which have been operated in this clinic in order to impress upon you some of the more salient features of postoperative care. Before we begin let me direct your attention to the fact that the urologist who is unaware of the potential complications incident to general surgery will have many a rude awakening. He must be aware of the fact that acute gastric dilatation reflex (adynamic ileus), cardio-respiratory complications are just as apt to occur after an operation on the kidney, ureter, bladder, etc., as they are after one on the stomach, gall bladder, appendix, etc. Only those urologists who have had the necessary experience in general surgery can fully appreciate this. I have just divided postoperative complications in general into those which are unavoidable and

those which are either avoidable or can be greatly minimized if one is on the watch for them. For the purposes of our today's clinic it is advisable to divide potential complications after urologic operations also into two groups:

A Those which may follow any abdominal operation

B Those which are especially apt to occur as postoperative complications after urologic operations. As just stated we will simply enumerate many of these and discuss others more in detail in connection with cases upon which we have operated.

A THOSE WHICH MAY FOLLOW ANY ABDOMINAL OPERATION

1 Cerebral thrombosis, embolism, or hemorrhage resulting only in hemiplegia or ending fatally during the period of convalescence from an operation.

2 *Cardiac Complications*¹—Cases with high vascular tension, anginal pains and dyspnea with marked non-protein nitrogen (as shown by chemical examination of the blood) form a group in which there is great danger postoperatively of complications such as emboli and coronary thrombosis with severe attacks of angina pectoris. A fatal outcome is not rare in such cases because so little can be done after these serious cardiac complications have appeared. They must be treated along general medical lines.

Cases with low blood pressure and evidences of heart muscle weakness are apt to develop symptoms of acute cardiac dilatation and decompensation. They can be treated with excellent results with digitals and stimulants.

The typical arrhythmias are not necessarily as serious complications as might appear at first glance. Showers of extra systoles in an otherwise good myocardium give a good prognosis, responding quickly to rest and sedatives.

We observed auricular fibrillation in Case I (nephrectomy for renal tuberculosis) and Case II (ureteronephrectomy for impacted ureteral calculus with severe infection). Such a car-

¹ I am indebted to Dr. D. L. Schram of our Medical Department and to Dr. Vance Rawson of the Chicago Memorial Hospital for assistance in the preparation of this portion of the clinic.

diac complication is not uncommon. It is not always serious, although it may be due to marked myocardial changes and hence calls for a careful study of the myocardium. Morphine pushed to the limit followed by digitalization gives the best results. This method of treatment is also indicated in cases complicated by tachycardia.

Heart block characterized by a slow pulse (below 50) is a serious postoperative cardiac condition. Absolute rest and digitalization offer the best outlook.

The presence of a heart murmur alone (provided there is no evidence of decompensation) is not to be taken too seriously. The main problem is to ascertain the degree of heart muscle damage. The patient with a blood pressure definitely low for his age offers a possibility of thrombosis when confined after operation, the one with atherosclerosis and hypertension is likewise a possible victim of cardiac dilatation or cerebral hemorrhage after general anesthesia and confinement to bed. Few of such patients but have ascertainable myocardial degeneration, and because of such pathology to which is added the stress of operative procedure and postoperative restraint they may easily become involved in dilatation, decompensation and auricular fibrillation.

The haphazard and unintelligent routine use of digitalis preoperatively is to be condemned. Each surgical patient should have a careful evaluation of the size of the heart by percussion and, if necessary, by means of a two meter plate, if there is doubt as to the integrity of the heart an electrocardiographic study will often be of great value. The functional ability of the heart may be learned from the "work test" together with more than one estimation of the blood pressure. A careful study of the lung bases especially may reveal the presence of a few moist râles and thus indicate early myocardial degeneration and the beginning of failure of compensation. The presence of an old valvular lesion or of a widened aorta should lead to careful evaluation of the possible risks engendered by operation. In the presence of a generalized infection the discovery of a chronic mitral lesion should bring to mind the pos-

sibility of the occurrence of an acute endocarditis on the chronic lesion and the danger of wide spread dissemination of septic emboli from this source

The fact that the welfare of the patient should be foremost in our minds ought to lead surgeons to give consideration to the above facts and their significance. They should more often utilize the services of a skilled internist in evaluating the factors of risk and welcome the sharing of their great responsibility.

3 Pulmonary Complications—(a) Bronchitis exacerbation of previous asthmatic attacks broncho and lobar pneumonia (often of metastatic & embolic origin as shown in Case III of today's clinic)

(b) Massive lung collapse¹

(c) Pulmonary embolism. This is often an unavoidable complication and occurs in two degrees of severity, one in which a large embolus becomes detached from a thrombosed vessel at or near the site of operation and is carried to the lungs where it blocks a relatively large branch of the pulmonary artery resulting in immediate death. In the other equally as fulminant but rarely fatal variety the embolus is relatively small and only blocks a less important branch of the pulmonary artery resulting in symptoms of shock, severe localized pain, hemoptysis and later evidences of consolidation with or without pleuritic friction sounds.

(d) Various pleural conditions

4 Gastric Complications—The most important of these is acute gastric dilatation. We will discuss this in connection with Case IV.

5 Intestinal Complications—(a) Mechanical or septic ileus. These need not be considered as a rule after urologic operations but occasionally as in a recent case which was being prepared for operation an intestinal obstruction due to mechanical causes (band from previous gynecologic operation) must not be overlooked.

(b) Reflex & adynamic ileus. There is such an intimate

For an excellent article on this complication see Ratvo Amer Jour Roentgenol 11 337 April 11 1924

relation¹ between the nerve supply of the urinary and that of the gastro intestinal tracts that it is not difficult to see how operations on the former may be followed by reflex paresis of the musculature, especially of the stomach and intestine. This complication resulting in marked abdominal distention and other

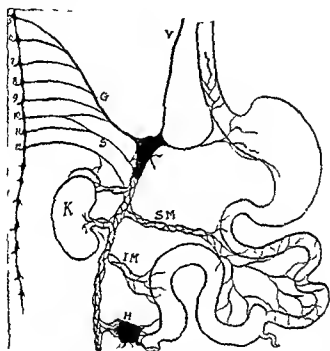


Fig 330.—Diagram of relation of nerves of the kidney to those of the intestine (after Luciani). *K*, Kidney. *V*, vagus nerve to celiac ganglion. *G*, greater splanchnic nerve, *S*, smaller splanchnic nerve. *SM*, superior mesenteric plexus, *IM*, inferior mesenteric plexus, *H*, hypogastric plexus. Note how nerves of kidney and ureter communicate in celiac ganglion with those of stomach and intestine.

signs of ileus occurs relatively oftener after operations on the kidney and ureter than after those on the lower urinary tract. We will discuss it in a more detailed manner in connection with Case III.

6 Peritonitis.—This needs seldom to be considered as a complication of urologic operations.

¹ The receptors of the sensory nerves of the kidney, ureter, and perirenal tissue stimulate reflexly the splanchnics, thus inhibiting the intestinal movements.

7 Renal Complications—In general surgery one must be careful during the period of preoperative preparation to examine the urine heart blood pressure etc. to avoid an exacerbation of a chronic or the occurrence of an acute nephritis. In urology there are many potential postoperative renal complications which the general surgeon but seldom encounters. These latter complications will be taken up in greater detail in connection with the presentation of Cases VI VII and VIII.

8 Diabetes—The preparation and postoperative care of patients suffering from diabetes does not differ in general or urologic surgery. It will be discussed briefly in connection with Case I.

9 Shock and Hemorrhage—These have been so frequently discussed as complications of general surgery that I will only direct your attention to the fact that they do not differ in any respect in urologic than in general surgery. We must constantly bear in mind first as a recent case has impressed upon us that the bleeding from the wound edges may be of symptomatic origin. In a case which we are to report shortly the patient had a severe hematuria out of all proportion to the small tuberculous lesion from which the hemorrhage arose. He continued to bleed from the edges of the operative incision and it was not until we recognized that it was of systemic origin that we were able to check the bleeding. Undoubtedly his hematuria was a combination of systemic and renal nature. Such a case has recently been reported in one of the French urologic journals.

10 Thrombosis or Embolism of the Peripheral Vessels—The first of these is not as serious a complication as the second. The thrombophlebitis most commonly involves one of the veins or arteries of the lower extremities usually the popliteal resulting in severe pain followed by edema. It is less commonly observed during recent years perhaps due to the earlier mobilization of the patient.

Embolism may occur in any peripheral artery but as was just stated concerning thrombosis it is most common in one of the arteries of the lower extremities resulting in gangrene.

11. Renal Complications Seen Especially After Urologic Operations.—A. *Evidences of Renal Insufficiency*.—(a) Of mild degree; evidences of dehydration (dry tongue, skin, etc.) with moderate stupor; (b) of more severe degree with marked apathy, muscular twitchings, hiccup, inability to retain food. As the renal insufficiency becomes more advanced, these symptoms are followed by convulsions and coma. (c) Anuria This will be discussed in connection with Case VIII.

B. *Evidences of Renal Infection*.—This may be: (a) Bilateral, with marked evidences of urosepsis associated to a greater or less degree with the symptoms of renal insufficiency just mentioned.

(b) Unilateral, *i. e.*, on side of obstruction, *e g*, of renal or ureteral calculus

(c) Unilateral at first, but soon there is involvement of the other kidney usually by way of the blood-stream (hematogenous route), less frequently by ascending infection by way of the bladder and opposite ureter.

C. *Hiccup*.—This was mentioned under the head of Renal Complications, but it may occur independently of that as a form of acidosis. It is a much dreaded symptom and at times very difficult to control. We have found that giving glucose in large doses per rectum and also intravenously, 250 to 500 c.c. of a 20 per cent. solution, is the most effective method of combating such a form of hiccup.

D. *Toxic nephritis of opposite kidney* (Case V).

After enumerating this apparently formidable array of potential postoperative complications let me present some cases in which we have encountered a few of these.

Case I.—Nephrectomy for Renal Tuberculosis and Ureteral (Tuberculous) Stricture Complicated by Severe Auricular Fibrillation.—Male aged forty-six, with history of recurrent left colics for preceding six months Treated for pulmonary tuberculosis two years before admission Our examination revealed marked pyuria, poor left-sided renal function, and a stricture of ureter (pelvic) on this side (Fig. 331), with dilatation above No tubercle bacilli found in urine from left kidney.

Case III—Pneumonia After Sacral and Field block Anesthesia—Male aged sixty seven with two vesical calculi marked cystitis urgency and very large prostate. No post operative complications after first step: *i. e.* when bladder opened under local anesthesia as first step of prostatectomy combined with removal of two good sized calculi. My only object in presenting this case is to speak of a severe pneumonia which followed the second step of the prostatectomy. This was performed after combined transsacral and caudal anesthesia and infiltration of the abdominal wall around the cystostomy incision. Within eight hours the temperature rose to $104^{\circ} F$ and the next morning evidences of consolidation were found at base of right lung. This was undoubtedly of embolic origin and must be borne in mind as a postoperative complication even though no general anesthetic has been given. This patient had a fully compensated systolic murmur.

Case IV—First Step of Prostatectomy Followed by Acute Gastric Dilatation and Intestinal Paresis (Reflex Ileus)—Although both of these postoperative complications are not so rare after operations on the intraperitoneal viscera urologists usually are lulled to a sense of false security in thinking that they are not at all as frequent after operations on the genito urinary tract. I am constantly on the watch for symptoms of reflex ileus after operations on the kidney and ureter but confess that this was one of the few cases in which I had seen it after cystostomy (first step) or after prostatectomy. This patient is sixty seven years old and was first seen during an attack of acute urinary retention. After decompression of the bladder it was deemed advisable to do a two step prostatectomy. Within forty eight hours after the cystostomy (done under local anesthesia) it was noticed that the abdomen was greatly distended and there was inability to pass flatus. There was an absence of vomiting. The heart was displaced upward as shown by replacement of the cardiac dulness by tympany. We inserted a stomach tube and evacuated a very large quantity of sour brownish fluid. The upper abdominal distention anxious ex

pression of the face, and rapid pulse were immediately improved. Upon inserting the rectal tube repeatedly and giving the treatment which I will describe shortly large quantities of flatus were expelled and the further postoperative course was uneventful. After the second step somewhat similar but less severe evidences of reflex gastro-intestinal paresis appeared, but subsided rapidly after treatment. We were dealing here with two analogous postoperative complications which recognized early usually can be conquered easily, but when allowed to develop without such early diagnosis may cause a fatal outcome.

Acute gastric dilatation is due to one of two conditions: (a) A paresis of the musculature with accompanying hypersecretion or (b) an obstruction of the duodenum by the mesenteric vessels. I do not believe one of these theories alone will explain all cases. Clinically I have found two groups of cases:

(a) Those in which the apparently effortless vomiting of large quantities of brownish sour fluid is the outstanding feature.

(b) Those in which there is no vomiting or only very little, but the dyspnea, cyanosis, and rapid pulse dominate the clinical picture as evidences of interference with the cardiac action by the enormously distended stomach (Fig. 333).

It is difficult to convince the average house officer that acute gastric dilatation can exist without vomiting, and I have found no reference to this variety in our text-books on postoperative complications. The stomach attains such an enormous size as to displace the diaphragm and thoracic viscera upwards and the remainder of the alimentary tract into the true pelvis (Fig. 333).

We have found that it is especially apt to occur in patients who are very apprehensive and have been given large quantities of fluid during the forty-eight to seventy-two hours after operation. It is our custom to explain this potential complication to our residents and nurses, and caution them after kidney or bladder operations to limit the ingested fluids to not more than 3 to 6 ounces every four hours for the first forty-eight hours, preferring to give fluid by proctoclysis at regular intervals or (after kidney operations) more or less continuously. The best method of treatment is the passage of the stomach-tube with

showed normal sugar content but the non protein nitrogen was 108 and the creatinin 4.8. A large tense mass was to be felt in the right upper quadrant which pyelography (Fig. 334) and aspiration tests revealed to be a hydronephrosis due to some form of obstruction at the outlet of the renal pelvis. The indigo carmin output on the opposite side was very poor and the same was true of phthalein. There was absolutely no elimination of the dyes on the hydronephrotic side. We removed this kidney



Fig. 334 —Pyelograms from case of infected hydronephrosis due to stricture at outlet of renal pelvis and complicated by toxic nephritis of opposite kidney. (See text.) A Before withdrawal of catheter. B After withdrawal of catheter showing complete retention.

under paravertebral (nerve blocking) anesthesia because we hesitated about giving a general anesthetic. For a few days after operation we observed the evidences of mild insufficiency of the remaining kidney in the form of nausea, difficulty in retaining ingested fluids and even vomiting. There was an absence of singultus which I always look for as one of the most common signs of postoperative renal insufficiency in our urologic cases. There was an absence of muscular twitchings which is also a prodromal sign of an impending uremia.

The patient was given large quantities of 5 per cent. glucose solution by proctodysis and the symptoms of mild renal insufficiency soon receded. Let me digress for a moment to say that we have found the administration of glucose as given in this case or intravenously (250 to 500 c.c. of a 10 per cent. solution) to be very helpful in conquering the milder and even the moderately severe forms of postoperative renal insufficiency.

The rapid decrease of the clinical evidences of nitrogen retention was very striking, and is confirmed by the chemical examination of the blood at intervals during the four months following operation

	Sugar	Total NPN	Crea %	Uric acid	Creatinin
September 18th	90	103	74	6.4	4.8
October 2d	98	113		7.4	
October 6th	88	100	80	6.5	3.6
October 28th		72	48	5.1	2.7
November 18th	97	73	45	6.4	2.4
December 17th	82	60	37	6.1	2.2

This shows that insufficiency of the opposite kidney may be due to toxemia and that its reserve power enables it to overcome such an influence.

Case VI.—Right Calculous Pyelonephritis. Nephrectomy Followed by Uneventful Convalescence for Three Weeks. Sudden Onset of Severe Colics on Opposite Side Followed by Complete Anuria. Relieved by Ureteral Catheterization.—This patient is a man of thirty-two giving the history of four severe attacks of right ureteral colics. He was seen during a fifth attack. There was a moderate degree of pyuria, one smaller oval and one branching shadow over the right kidney area which were included in a pyelogram. Examination of the

opposite ureter and kidney revealed nothing abnormal including plain films for detection of calculi as well as ureteropyelography. Removal of the calculus infected right kidney was deemed indicated on account of the fear of reformation of calculi due to the degree of infection which our urologic study had shown. The removed kidney in addition to a diffuse pyelonephritis revealed two shot sized calculi in several minor calices in addition to the two larger ones. Convalescence was uneventful until the third week when he began to have very severe pain in the left (opposite) lower quadrant of the abdomen. Upon introduction of a catheter into the left ureter with the object of relieving the pain some old blood escaped in a steady stream followed by a considerable amount of urine as if under tension. Although a plain radiograph failed to reveal the presence of a calculous shadow we encountered an obstruction just above the bladder which we had great difficulty in passing until an olive-tipped ureteral catheter was used. We have found such a tip very useful in getting beyond an impacted ureteral calculus. Unfortunately this catheter was expelled about twelve hours later. From this time on no urine was passed and the bladder was found to be empty. A ureteral catheter was again inserted into the left ureter and considerable clear urine evidently under tension evacuated. His symptoms of incipient renal insufficiency such as restlessness, apathy, nausea, inability to retain fluids and headaches disappeared rapidly after insertion of the ureteral catheter which was left *in situ* for forty-eight hours. Later the ureter was dilated to favor the expulsion of the shadowless calculus which had blocked the ureter and given rise to anuria.

Looking back we see that this patient had two calculi in his right removed kidney which gave distinct shadows and two which did not. Even when the kidney after removal was placed on an x-ray film and another exposure made these two shadows were very faint. I shall not digress to take up the question of how easy it is to overlook these shadowless calculi. What we are chiefly interested in is the anuria which developed as the result of a similar shadowless calculus blocking his only remain-

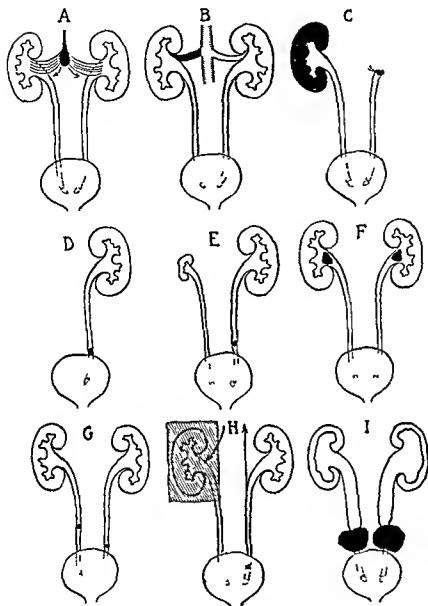


Fig. 335.—Diagrammatic representation of the more common forms of secretory and obstructive anuria. **A**, Central inhibition through nerve action on the ureter and both kidneys. **B**, Thrombosis or embolism unilateral (at times bilateral) checking secretion through deficient blood supply. **C**, Inability of opposite kidney to function as result of disease or obstruction after removal of the other one. **D**, Obstruction of ureter by calculus (or renal pelvis) of a congenital solitary kidney. **E**, Same as **D**, but opposite kidney has never developed. **F**, Obstructive anuria due to bilateral blocking of renal pelves by calculi. **G**, Similar condition to **F** but both ureters blocked. **H**, One ureter blocked by calculus and opposite kidney reflexly inhibited (reflex anuria). **I**, Obstructive anuria due to compression of both ureters by carcinomatous extension from uterus, rectum, etc.

ing ureter three weeks after the right nephrectomy. That a calculus firmly impacted in the narrowest portion of the ureter viz just above the bladder was the cause of the obstruction is evident from our ureteral catheterization findings as just given. The prompt relief of the anuria during the first twenty-four hours after passing beyond the calculus with an olive-tipped ureter is very gratifying and in line with the method of treatment of all varieties of obstructive anuria (especially calculous) which is today the one most popular¹ with urologists.

There are many different classifications of the causes of anuria. It would seem to be the simplest plan to divide them into two principal groups as the majority of European urologists and internists have done. These two chief divisions are A secretory and B obstructive. In the first named there is either a cessation of urinary secretion as the result of some disturbance proximal (*i. e.* prerenal) to the kidney or within the kidney parenchyma itself (*i. e.* renal). In the second chief division the cause is either at the outlet of the renal pelvis or distal to it *i. e.* postrenal or excretory hence the term obstructive. In Fig. 335 (page 727) and the following table I have attempted to clarify this rather difficult task of a classification of the causes of anuria.

As to the clinical aspects we as urologists are not only interested in the obstructive but in the secretory type as well.

CAUSES OF ANURIA

A Secretory

1 Prerenal *i. e.* proximal to kidney

- (a) Vascular spasm inhibiting main renal vessels
- (b) Hysteria—probably due to same cause as (a)
- (c) Low blood pressure accompanying shock, severe hemorrhage, loss of large amounts of fluid by emesis or diarrhea, advanced cardiac decompensation

¹ At the recent (September 1926) German Urologic Congress held at Vienna I heard Fabricius speak on the results of the various methods of treatment of obstructive anuria. Ureteral catheterization was followed by the largest percentage of cures.

(d) Embolism or thrombosis of the main vessels on one or both sides If unilateral, the non obstructed kidney is influenced reflexly in many instances

(e) Reflex inhibition as the result of peripheral irritation

2 Renal : *e* affecting parenchyma (usually equally on both sides except in *d*)

(a) Acute glomerulonephritis *e g* Postscarlatinal

(b) Acute nephrosis *e g*, bichlorid and similar selective renal poisons

(c) Chronic glomerulonephritis (renal sclerosis)

(d) After removal of one kidney the other ceases to function as result of advanced parenchymal changes which have been either overlooked or underestimated as to extent before the nephrectomy

B *Obstructive* (also termed "postrenal" or "excretory")

Intrinsic, *i e*, within lumen of ureters or renal pelves, or both

(a) Calculi, blood clots, or neoplasms blocking both renal pelves

(b) Same as (a) blocking renal pelvis or ureter of one side and reflexly inhibiting opposite normal kidney

(c) Same as (a), but opposite kidney either congenitally absent or has been removed

(d) Same as (a), but opposite kidney either congenitally hypoplastic, *i e*, not developed, or the seat of extensive destruction from disease

(e) Blocking of urethra by structure or neoplasm or of bladder neck by enlarged prostate or tumor resulting in pressure atrophy of renal parenchyma and later in anuria This is a combination of obstructive and secretory anuria, the former preceding the latter usually for a long period

Anuria may appear suddenly or be of gradual development. The former gives a far better prognosis because it has been shown that the kidney can regain its function after seven but not after fourteen days of obstruction.

The symptoms which accompany an anuria vary greatly. Theoretically we are taught that there is a period of tolerance before the symptoms of uremia appear and that there may be a complete absence of any concomitant clinical manifestations. As a matter of every day experience I cannot agree with this view. We have observed marked restlessness, hiccup, twitching, nausea, vomiting and an inability to retain ingested solid or liquid food during the first twenty four to forty eight hours of the anuria. The period of tolerance varies in length from twenty four hours to twenty six days (Louis Frank's case). It is our duty to ascertain as soon as possible whether the anuria is of secretory or obstructive origin. If the former every effort should be made through the use (a) of large amounts of fluid (hypodermoclysis, proctoclysis or by the use of the duodenal tube combined with continuous drip as in McCarthy's case) (b) hot baths (c) external hot applications over the kidneys (d) diathermy to re-establish secretion. If this is unsuccessful operative measures such as decapsulation must be considered. This has been of little use however especially in bichlorid poisoning nephroses.

If there is an obstruction no time should be lost in waiting for radiography to localize the site and the cause of the obstruction. Ureteral catheterization can be easily carried out and resort to this procedure should be our method of choice in anuria due to calculous obstruction in the ureter itself or at the outlet of the renal pelvis. Up to the present time it has afforded relief and resulted in recovery in a larger number of cases than by any other method. Every twenty four hours of delay after onset of the anuria (just as intestinal obstruction) increases the mortality. If one is unable to catheterize the ureters or if this has been unsuccessful operative procedures preferably a pyelotomy should be resorted to.

CLINIC OF DR IRVIN S KOLL

MICHAEL REESE HOSPITAL

RENAL AND URETERAL CALCULI¹

BEFORE considering the clinical data of calculi of the kidney and ureter let us speculate briefly upon some of the etiologic factors productive of these concretions. I use the word *speculate* deliberately because we must admit at the outset that the formation of the aseptic stone in the kidney in most instances is without any scientific explanation. The various diatheses have never been sufficiently elucidated to give them rational recognition notwithstanding the tendency to stone formation in the urinary tract does exist without any explanation for its being. By this I mean that individuals produce a urinary sedimentation which agglutinates into calculi of varying size and location without any reason for same and in every other respect these individuals are quite normal as far as it is possible to determine from every physiologic and biologic point of view. Nevertheless impaired nutrition as a result of defective hygiene the improper or over intake of food and insufficient elimination undoubtedly play important roles as causative factors. This type of calculi producers as compared to those of infectious origin is three to one.

Over ten years ago Hunner began to give to the profession his work on ureteral stricture. He claims and now his claim is generally accepted that narrowing of the ureter is productive of stone formation. The reverse too is also true and probably more often so. The explanation is interference in drainage the stasis which is more or less marked causing the precipitation of the urinary salts a stone resulting.

¹ From the Departments of Urology and Roentgenology of the Michael Reese Hospital

The origin of renal calculi is invariably in the pelvis, the calices or their finer ramifications. There is no such thing as the formation of a calculus in the kidney parenchyma. Ureteral stones are of course primarily renal and only become ureteral after their passage into the ureter.

We must also consider those calculi which form secondary to other pathologic processes in the kidney in which instance the infection is the primary consideration. It must also be understood that infection of the kidney may be secondary to the stone formation.

The geographic distribution is interesting. In Europe the Anglo Saxons show more of a predisposition than the Russians, Hollanders, Italians and Hungarians. In Asia it is common in India, Arabia and Persia, very rare in China and wide-spread in Egypt, due no doubt to the heavy content of salts in the waters of the Nile. In the United States the cases are more frequent in the Mississippi Valley. Heredity does not seem to play any active part except in so far as the ancestral morbidity of the so called urinary and arthritic diatheses may be concerned.

Arbitrarily lithiasis can be divided into primary, uric or oxalic concretions and secondary or phosphatic, admixture of these salts frequently occurs.

Secondary phosphatic concretions occur as a result of inflammation and suppuration of the renal parenchyma augmented by alkalinization of the urine, the salts thus precipitated acting as a nucleus for the calculus.

Primary phosphatic concretions are the result of hyperalkalinity of the urine, the origin of which may be the ingestion of food containing a high percentage of calcium salts or of various metabolic changes secondary to nutritional disturbances.

Uric and oxalic acid precipitation may be considered as being the result of the same conditions. It is well known that oxaluria results from an arrested nitrogenous combustion. Cystin and xanthin deposits have as their origin the same process.

In the normal urine there are between 15 and 20 mgm. of oxalic acid secreted in twenty four hours. This physiologic oxaluria

is augmented under the influence of an increased vegetable diet, particularly tomatoes and rhubarb.

Calculi can be classified physically into sand particles, gravel, and stones; they may be single or multiple, in any location, in one or both kidneys at the same time.

There is no limit to the size a single stone may attain; the shape may assume some fantastic form or be geometric in its outline. Those formed in the renal pelvis may be bifurcated or take the mold of the pelvis and calices.

The smallest stones, which may vary from the size of a millet seed to a lima bean, are variable in number. A small, single stone may lodge at the ureteropelvic junction and completely obliterates it. A number of small stones may form in the pelvis and become faceted or articulated in the manner they are usually found in the gall-bladder.

Stones in the kidney can be motile or fixed, the former, when they become migratory, pass into the ureter and thereby produce acute colic, mis-called renal, as it is really ureteral.

The occurrence of calculi simultaneously in both kidneys is more frequent than was formerly thought. The frequency, as reported by various genito-urinary surgeons, varies from 12 to 40 per cent.

CLINICAL TYPES

1. Silent renal.
2. Symptomatic renal.
3. Migratory ureteral.
4. Fixed or encysted ureteral.
5. Crystalline "shower."
6. Phantom calculi:
 - (a) Calcified lymph-nodes.
 - (b) Scar tissue.
 - (c) Phleboliths and enteroliths.

PATHOLOGY

The presence of a stone in the pelvis or one of the calices is accompanied by more or less pronounced morbid changes. However, these changes may not occur, and following either the

spontaneous expulsion or surgical removal the renal tissue may be restored quite to the normal

The walls of the pelvis may become thickened due to tissue proliferation produced by the continued irritation

Simple dilatation may accompany the presence of calculi in the pelvis or calices. This dilatation may be the forerunner of retention which if aseptic represents what is termed calculous hydronephrosis

The presence of a stone in the pelvis invites bacterial invasion. This may occur via the blood stream but more often through the lymph channels ascending from the intestinal tract

We then have the septic kidney which in the beginning is called clinically a pyelitis but I have shown experimentally that in all probability pyelitis as a pathologic entity does not exist but at the outset the infection is a pyelonephritis the more marked changes taking place in the pelvic mucosa. If the infectious process progresses the kidney is sooner or later converted into a purulent organ or pyonephrosis

Over 95 per cent of the calculi which pass from the kidney into the ureter either pass spontaneously into the bladder or can be made to do so by instrumental manipulations

If permanently lodged they may attain a great size usually obstruct the urinary flow and thus destroy the kidney

In the instance of a stone becoming lodged in the ureter the immediate changes in the tube involves only the mucosa. If the irritation continues over a period of time the inflammation extends deeper with ultimately a chronic interstitial ureteritis resulting this after removal of the stone will invariably contract and the ureter becomes strictured. It may be avoided by postoperative dilatations

The vast majority of stones which lodge in the ureter quickly become grooved so that a small amount of urine is always passing

SYMPTOMATOLOGY

Let us consider the symptoms of renal and ureteral stones under three groups. Those due to (1) retention in the kidney (2) due to migration and (3) to ureteral obstruction

One may often be surprised when radiographing a patient as part of a routine examination to find a large renal calculus which has never produced any subjective symptoms. Urinalysis usually shows pyuria. In my experience I have discovered a number of stones in patients who were refused life insurance on account of pus in the urine, the patients having been entirely free from any discomfort whatever. One must give credit to the many urinalysis laboratories now so common in the larger cities as helpful in making early diagnoses of the various kidney lesions, which otherwise might go unnoted by the patient until much greater harm is done. Here again is frequently found the kidney stone, nestling quietly in a calyx, causing the subjective symptoms, the patient innocent of its presence until told to consult his physician on account of either pus or blood in the urine.

It is the patient with the dull ache in one or both of his lumbar regions, gradually growing worse, who is so familiar to all of us. Urinalysis usually reveals microscopic pus or a few red cells, and the x-ray verifies or negates our suspicions.

It is, of course, the calculus after forming in the pelvis or a calyx and passing into the ureter which produces the typical colic, misnamed renal, as it is ureteral. During the passage of the stone down the ureter the maximum pain is produced; when the migration stops the pain likewise stops, the soreness and tenderness on palpation usually persist for some days.

The attacks of colic may last from several hours to several days, and possibly the stone may have traveled only 1 or 2 cm. during a very long siege. One may be surprised too to find that the stone may appear higher up in the ureter than was shown on the previous x-ray film. This retromigration is uncommon (Fig. 336).

It is difficult to estimate the average number of migrations before the calculus is expelled into the bladder. This depends on the size, shape, and surface of the concretion, and the quantity of narcotic given to stop the ureteral peristalsis in its effort to carry the stone down its lumen. If an estimate were ventured as to the length of time covered for an average-sized ureteral

calculus to pass from kidney pelvis into the bladder, it would have to cover the space of time from a few hours to six months

A calculus may become "fixed" or "encysted" anywhere along the ureter but usually occurs not far from the ureterovesical orifice (Fig 337) This arrest fortunately happens only in about 2 per cent of all calculi which leave the kidney The stone thus arrested if left *in situ* for long will increase in size finally completely obstructing the ureter

The "crystalline shower" is an interesting and common clinical phenomenon It is not generally recognized Subjectively the picture is one of a severe ureteral colic which usually is accompanied by either macro or microscopic hematuria and a heavy sediment of uric acid crystals or oxalates The colic usually endures for a few hours at maximum The surprise comes with negative x ray findings The attacks may recur until the fault in metabolism is corrected

The "phantom calculus" is the source of much unhappiness Every experienced urologic surgeon one time at least has exposed a kidney or ureter giving a definite well defined shadow pronounced unquestionably a stone by the roentgenologist become embarrassed and chagrined at finding no stone but either a calcified lymph node a band of scar tissue or nothing at all

Upon the Roentgen ray the burden of responsibility rests in diagnosing urinary calculi The modern technic, the perfection of the armamentaria such as now installed in this department at the Michael Reese Hospital together with pyelography and ureterography, makes failure almost impossible

We must not be unmindful however of the pitfalls in differential diagnosis Phleboliths and enteroliths must be differentiated, usually this can be done by the shadowgraph catheter and by the shape of the shadow

The acute colic must be diagnosed from the renal crisis of spinal lues and from acute seminal vesiculitis, not necessarily associated with gonorrheal urethritis

Acute retrocecal appendicitis with even a few red blood cells in the urine and gall stone colic may simulate a ureteral colic



Fig 336 —Retro-migratory ureteral calculus When operated this calculus was found half way between the kidney pelvis and bladder



Fig 337 —Large fixed or encysted ureteral stone Ureter fibrous around it producing stricture eventually necessitating nephrectomy.

PROPHYLAXIS

There is little to be said about the prevention of calculous formation in the urinary tract. It must be admitted that the average individual drinks too little water. A diluted urine must of necessity lessen the chances of crystalline sedimentation. In these regions there is a superabundance of calcium salts in the drinking water. For this reason it is well to recommend to the calculus diathetic the exclusive use of distilled water. Rhubarb, asparagus and tomatoes because of their richness in hippuric, oxalic and malic acids are best eliminated from the diet.



Fig. 338. Multiple bilateral renal calculi in a woman fifty-eight. Inoperable.

Because of the now established facts concerning focal infections as factors in renal infections, the teeth should be kept in good condition and infected tonsils removed.

I can think of but three contraindications to the removal of stone in the kidney: they are (1) in advanced age if the concretion is in one of the calices and is aseptic; (2) if the concretions are multiple in both kidneys (Fig. 338); (3) if there is other pathology such as a cardiac lesion or diabetes which would make any surgical interference hazardous.

Thus do we come to the all important question of conservative versus radical procedure in kidney surgery in the

presence of single large or multiple calculi. From the outset I frankly admit that I am far from settled in my mind when to be radical. I lean strongly to the side of conservatism, notwithstanding that it has not infrequently brought me sorrow. By this I mean a secondary operation has been necessary for removal of a kidney that I inclined to give nature a chance to heal after removal of one or more stones (Fig 339). I am still

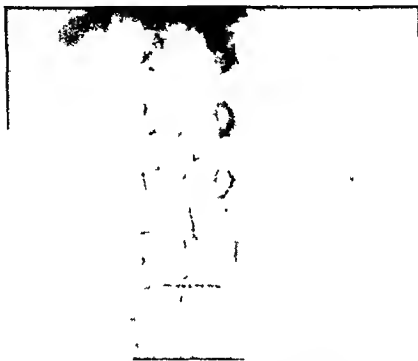


Fig 339 — Multiple calculi in left half of horseshoe kidney

inclined toward this conservative side despite the antagonism encountered among my colleagues (Figs 338, 341, 342). I march on under the banner of "it requires more skill and more courage to remove a stone from a kidney than to remove the kidney along with the stone."

To quote from Pugh, "In the whole realm of surgical procedure there is no type of problem which calls for such a nicety of judgment in its handling as that of ureteral calculus."

One is moved to anger when he reviews the mishandling of



Fig 340 —Multiple calculi removed through pyelotomy Complete recovery



Fig 341 —Stone filling pelvis and projecting into ureter Almost complete obstruction

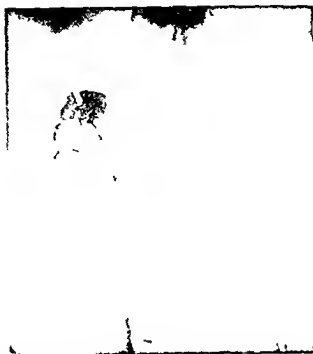


Fig. 34. Same case as Fig. 341. Postoperative pyelogram. Despite considerable hydronephrosis there was sufficient normal renal tissue remaining to warrant giving nature a chance. Patient entirely well.



Fig. 343.—Stone necessitating ureterotomy. For one year this ureter has been dilated monthly. Urine now free from pus.

these cases by incompetents and the wanton display of surgery in the removal and only too often failure of removal of ureteral stones

To cut down on a ureter is truly a serious matter the result is almost invariably a stricture of the duct with the ultimate destruction of the kidney necessitating nephrectomy

When all procedures fail with instrumental manipulation for removal of ureteral stone and ureterotomy is definitely indicated it is vital to carry out dilatation for many months following convalescence (Fig 343) By this means alone can we hope to avoid contracture at site of ureterotomy

As said before 95 to 98 per cent of stones which pass into the ureter either go through into the bladder spontaneously or can be made to do so It is surprising at times how large a stone may be passed They are aided in their passage by lubrication of the ureter dilatation with bougies dilators of the Dourmaskin type inlying catheters and the production of increased peristalsis by the hypodermic injection of pituitrin

When then do we feel that we have failed in our efforts to remove ureteral stones endovesically? Not until after repeated efforts with all our armamentaria there is no progress in the passage down the duct and providing the calculus is not associated with any of the following conditions or complications

- 1 If the stone has a diameter greater than 2 cm or its surface is spiculed
- 2 If the kidney is being distended and cannot be relieved by ureteral catheterization
- 3 Association of cardiac lesions
- 4 Intolerance of repeated cystoscopic examinations
- 5 Presence of infection in the kidney as indicated by chill and high temperature
- 6 Reflex anuria

CLINIC OF DR VINCENT J O CONOR

WASHINGTON BOULEVARD HOSPITAL

TRAUMATIC DISLOCATION OF THE KIDNEY

OUR subject today is one which has been a matter of considerable discussion among surgeons and urologists for several years. We will consider the relationship of malposition or displacement of the kidney to lumbar abdominal, and pelvic pain, and discuss briefly the etiology diagnosis and therapy of this condition.

A few preliminary anatomic and physiologic considerations are pertinent. As you well know, the kidneys are situated behind the peritoneum of the upper abdomen on each side of the vertebral column, their exact level varying considerably in different individuals. The right kidney is usually one half to a whole vertebral level lower than the left, and in the female both kidneys are lower by about half a vertebra than in the male. The smooth surface of the kidneys is covered by a firm layer of fibrous tissue which is closely applied to the surface of the organ, the inner layer of this capsule contains a network of smooth muscle fibers. Each kidney lies in a considerable amount of loose fatty tissue which is greater in amount about the margins of the organ than in front or behind.

A loose sheath of fibrous tissue surrounds the kidney and most of its fatty capsule. It is evident that the kidneys are held in position in the renal fossa chiefly by their fatty capsules and by intra abdominal pressure which is somewhat above that of atmospheric pressure. Under normal conditions the peritoneal folds fascial bands and vascular pedicles play but a small part in the support of their weight. The shape of the para vertebral fossa in different individuals may influence the range

of motion and because in women this space is more cylindrical and shallow and more open below than in men there is normally a greater variation in position and more liability to displacement. When the kidney descends to an abnormal extent the perirenal fat largely accompanies the kidney, while the upper part of the fascia with the fat and adrenal gland contained in it is more firmly fixed and never descends with the kidney.

The pelvis of the kidney is usually funnel shaped with its apex at about the level of the lower pole of the kidney, although many variations of its size and position occur and it is not infrequently entirely intrarenal. The ureter is about 12 inches long from the ureteropelvic junction to the point of entrance into the bladder. In its course to the bladder it lies directly beneath and in close association with the peritoneum.

It is quite obvious therefore that any factor bringing about a descent of the kidney may work independently of the ureter and result in a displacement of the kidney while the ureter more or less maintains its original position. In this event there is an excessive length of ureter present and the resultant tortuosity predisposes to ureteral kink and angulation.

Since the urine is propelled down the ureter by frequent peristaltic waves inherent in the wall of the tube itself, it is only when by virtue of adhesion or marked rotation, an angulation results which bends, kinks or twists the ureter that partial obstruction of the lumen results.

In general there are a number of conditions which favor the possibility of development of mobile kidneys. Congenital predisposition, general visceroptosis, body form, repeated pregnancies and relaxed abdominal wall, rapid absorption of the perirenal fat and trauma are usually to be considered. Clinically we are not concerned with the usual case of movable kidney because it causes no symptoms and there is no resultant ureteral obstruction. The fact that these patients demand no detailed study of their ptoses should not lead us to disregard the large group in which ureteral kinking and obstruction results in chronic or acute pain, often obscure in type and back pressure of urine with all its sequelæ. All too frequently the

surgeon is misdirected to an ill advised abdominal operation for pathology which seems more obvious

During the past six years we have studied 54 patients with movable kidney by modern urologic methods. The histories, clinical findings and roentgenologic data in 22 of these patients indicated the advisability of surgical intervention for fixation of the kidney and freeing of the ureter. Nine of these patients dated the onset and course of their trouble so intimately with mechanical injury and the operative findings so closely tallied with this supposition that they have been definitely classed as traumatic in origin. We cannot, of course overlook the fact that in these individuals there were undoubtedly predisposing factors which made this traumatic displacement possible.

This traumatic loosening of the kidney may be due to a slow gradual loosening of its attachments but is more often due to a sudden rupture of its fascial and peritoneal coverings. Perirenal and peri ureteral hemorrhage occurs and the resultant organization about these areas may result in sclerotic attachments which compress or angulate the ureter or renal pelvis. If low grade infection supervenes in these areas of extravasation the subsequent density of these cicatrices will be increased and as contraction occurs there will be a gradual compression of kidney pelvis or ureter. If the kidney is not displaced and the trauma affects only the perirenal tissue a subsequent perirenal sclerosis may result. We have seen 4 such cases in this clinic. Congenital anomalies such as anomalous renal vessels, double ureter, etc. are more often found associated with these post traumatic obstructions.

I wish briefly to cite a few cases illustrative of this condition.

Case I —Dora W., an unmarried telephone operator twenty four years of age presented herself in November 1924 stating that she had always enjoyed perfect health until six years before when she had suffered a severe fall while ice skating. Since that time there had been persistent bilateral backache radiating into both hips. There had been blood in the urine for several days following the fall. The only relief from pain was to lie in bed.

x Ray studies at the time of the accident showed no bony abnormality. She was referred for chronic backache and albuminuria.

Both kidneys were mobile to the extent of being lost in the pelvis when palpated in the upright position. Pyelo-ureterograms in the prone position showed normal pelvis and ureteral outlines with the kidneys in normal position. When these were

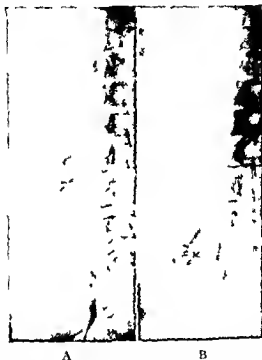


Fig. 344—A Pyelo ureterogram in the prone position. B Same with patient in the upright position showing marked ptosis and complete angulation of the ureter at the pelvic junction.

repeated in the upright position both kidneys were dislocated below the iliac crest and the ureters were outlined as tortuous and kinked and obviously obstructed (Fig. 344).

Bilateral nephropexy was done at separate operations. In both procedures dense attachments were found binding the mid ureter to a sclerotic postperitoneal attachment. This patient

is now free of all pain has gained 25 pounds and for the past eighteen months has had normal urinalyses

Case II—William T, aged forty five, presented himself in January, 1923, complaining of severe pain in the left lumbar region radiating into the left lower abdomen and groin Eight weeks before he had been violently thrown against the top of an automobile while sitting in the rear seat Examination showed a tender palpable left kidney, and a moderate amount of albumin in the urine Pyelo ureterograms in the upright position showed a sharp angulation of the midureter and early hydronephrosis At operation for kidney fixation a dense scar was found about the ureter at the point corresponding to the angulation in the roentgenogram This patient was immediately relieved of all symptoms and repeated urinalyses have since been normal

Case III—Tillie C, an unmarried girl of seventeen presented herself in August 1922 complaining of a persistent dull ache in the right lumbar region radiating into the right groin and vulva This pain had been persistent for three years following a fall from a horse Appendectomy six months previously gave no relief There was intense right sided pain during menstruation

Examination showed a tender widely movable kidney, and pyelo ureterograms in the upright position showed third degree ptosis with angulation of the ureter at its lower third (Fig 345) Fixation of the kidney gave complete relief and she has had no further pain and menstruation is normal

These histories are typical of the 9 patients in whom the diagnosis of traumatic dislocation of the kidney was made I will merely demonstrate the pyelo ureterograms of remaining cases

In no department of surgery have the clinical results been so satisfying as in this group of cases Where the history is in doubt, or where there is merely ureteral obstruction without angulation in the ureterogram it is well to practice progressive ureteral dilatation before advising nephropexy A certain per

centage of these patients will be permanently relieved by dilating the ureter to No 12 or 14 F in size. A number of our patients who were not completely relieved by dilatation have been cured by nephropexy.

To obtain good and lasting results a careful technic is essential. Properly performed there seems no good reason why a kidney fixation should not be a success. The method used in this clinic differs somewhat from the one usually employed.

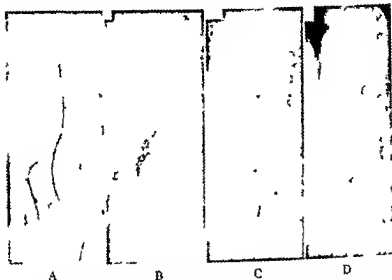


Fig 345—A Pyelo-ureterogram in the prone position showing normal outline and position of pelvis. B Same with patient in the upright position showing complete rotation of kidney so that apex of pelvis points upward. C Pyelo-ureterogram of low lying kidney with catheter in pelvis. D, Same in the upright position showing rotation of kidney and several complete angulations of the lower ureter. (It is necessary to completely withdraw the catheter when making the pictures in the upright position or the ureter will be straightened in splint like fashion by the catheter.)

Operative Technic—With the patient in the usual position for lumbar operation an incision about 5 inches long is made from the middle of the twelfth rib in the direction of and just above, the iliac crest. A large incision is unnecessary, as the kidney is most easy to isolate and deliver outside the wound. The kidney is freed in the usual manner and *all fatty tissue*

excised The pelvis and ureter are carefully separated from surrounding attachments, the latter being isolated down to the level of the bifurcation of the iliac vessels. A careful search is made for anomalous vessels or fibrous bands, and these are severed if there is a normal blood-supply at the hilus.

The true capsule is then incised both anteriorly and posteriorly and reflected carefully down to the region of the hilus. If this is done gently, no cortical tissue will be traumatized.

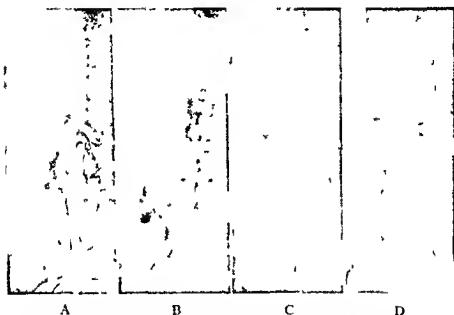


Fig. 346—A, Pyelo-ureterogram in the prone position showing early hydronephrosis. B, Same in the erect position showing marked ptosis and angulation of the ureter. C, Pyelo-ureterogram in the prone position. D, Same in the erect position showing rotation and descent of the kidney.

The capsule is then incised over the lower pole and reflected upward for a distance of about 2 inches. This leaves a band of capsule about 2 inches wide surrounding the middle of the kidney. The capsule is then overlapped so that three layers are available for the placing of suspension sutures. A Y-shaped interlocking continuous suture of No. 2 chromic catgut is then placed from the convexity toward the hilus both anteriorly and posteriorly. The ends of these sutures are left at least 6 inches

long. The strength of these suspending ligatures when taken in this manner is very great and they can be tested to show that no separation of capsule or cortical tissue will result when they are placed under tension. With the kidney displaced downward the renal fossa is enlarged by blunt stretching with moist gauze packs.

The posterior tension sutures are then first carried under and above the twelfth rib as far toward the costovertebral region as possible. When these are in place the anterior sutures are passed over the twelfth rib more anteriorly. The kidney is then pushed up firmly beneath the diaphragm and the elevation apparatus on the table is lowered. The posterior and anterior sutures are tied simultaneously above the rib and then the remaining strands of all four are tied again. This procedure serves to hold the partially decapsulated kidney in such a position that adhesions to the psoas muscle and diaphragm are inevitable. The suspending sutures are merely temporary insurance that the kidney will be held in a proper high position while adhesions are being formed. No further anchoring of the kidney is necessary and the usual closure can be made without drainage.

It is a simple matter to incise the posterior peritoneum and perform an appendectomy after the kidney has been prepared for suspension.

CLINIC OF DR HUGH N MACKECHNIE

SOUTH SHORE HOSPITAL

SPLENOMEGALY

Two Cases of Splenic Anemia, One with Severe Hemorrhages
Two Cases of Myelogenous Leukemia, One Treated with
x-Ray and One Operated
One Case of Hodgkin's Disease Treated Over a Period of Six
Years with Recent Ocular Disturbance

TWO CASES OF SPLENIC ANEMIA, ONE WITH SEVERE HEMOR- RHAGES

Case I—MRS M B complains of an aching pain in the upper left lumbar and lower thoracic region. It is present all the time, and is aggravated by moving of the arms in exercise or work, either in the house or in her garden. It is made worse by stepping down a step or off the curb or by lying on the right side. She will get relief from the worst pain by resting or by bending toward the left side or by turning from the right to the left side. At no time does she have any very acute pains. There appears to be no relation of the pain to the taking of food or to constipation or other gastro intestinal conditions. Her appetite is good, bowels regular. She sleeps well except when the ache interferes. Menstruation stopped suddenly at the age of forty eight since which time she has not really felt well.

Some three years ago Dr Jones had her in charge for some rheumatic pains in her foot and also for some pain in the right hypochondrium referred through to the back. Blood examination at that time showed 4672000 red corpuscles, 8800 white corpuscles, with a differential count of 70 per cent polymorphonuclears, 2 per cent large mononuclears, 27 per cent small mononuclears and 1 per cent transitional, hemoglobin 90 per cent, color index 1. Red cells were normal in shape and size.

and stained well. Urinalysis was negative for albumin and sugar. After treatment for a time she recovered from the pain in the hypochondrium but the discomfort in the back persisted.

Again in 1925 she had pain starting in the left hypochondrium which did not yield to treatment. There was also some tenderness in the right hypochondrium which responded to treatment. In recent months the pain in the left side has become worse so that it is really disabling and the need for relief is pressing.

As you see she is a well nourished woman apparently in the fifties who looks strong and healthy. The abdomen is well rounded and on light pressure no tumor mass can be felt. On deep pressure the gall bladder area is quite sensitive. In the left hypochondrium a mass can be felt under the ribs which has a sharp edge and is tender. The lower pole of the left kidney can be felt and is not tender. One cannot distinguish the tumor mass from the kidney on palpation. Pressure increases the aches of which she complains most of the time.

Skiagraph of this area shows a shadow above and mesial ward from the renal fossa. It has much the shape of the spleen but is much larger than the normal spleen which should not be visualized on the plate.

Blood examination shows 4 010 000 red corpuscles 75 per cent hemoglobin 5950 white corpuscles with a differential count of 60 per cent polymorphonuclears 35 per cent small lymphocytes 2 per cent large lymphocytes eosinophils 2 per cent and large mononuclears 1 per cent platelets 190 000 coagulation time five minutes. There is evidence of anocytosis and microcytosis. Urinalysis shows nothing of importance.

The diagnosis in this case is Banti's disease in a relatively early stage. It is made on the enlargement with a sharp edge the pain in the region due to perisplenitis the leukopenia and the tumor mass as shown on the x ray plates. The failure to find blood in the urine the lack of symptoms referable to the kidney together with a normal outline of kidney speaks against a renal tumor or a hypernephroma. Other splenic enlargements would have blood changes characteristic of them as in pernicious anemia myelogenous leukemia with its great increase in

myelocytes, pseudoleukemia with its lymphatic gland enlargements in the neck, the axilla, and the groin. The pain, which in this case might be misleading, indicates a perisplenitis with adhesions which the enlarged spleen is pulling on

The patient is prepared for operation. We make a left paramedian incision in the upper abdomen. There appears to be no gastric or duodenal pathology, but there are some adhesions between the gall-bladder and the colon and the duodenum. The gall-bladder is enlarged and full of material that is not expelled with pressure. The left kidney is normal in size, shape, and consistency. Above it and mesialward is a spleen that is enlarged and firmly adherent to the diaphragm. The adhesions are broken down with care, and at two places they are so firm and thick that ligation is required. There is some hemorrhage, but it will stop with the application of a hot pack against the diaphragm in the bed of the spleen. The pedicle is now clamped and the spleen removed. The stump is doubly ligated in two parts with fixation ligatures to insure hemostasis. Note the tail of the pancreas running into the pedicle of the spleen. One must remember that this sometimes occurs, and care must be exercised not to include it in the clamp or ligature. The hot pack is removed and we find that the bleeding has stopped. The patient being in good condition, we will look at the gall-bladder again and try to remove it. The stronger adhesions are separated and ligated. The peritoneum is incised along each edge of the bladder down to the cystic duct. I do not leave much of this membrane for covering purposes, as I find that in most cases when the gall-bladder is removed the liver on either side falls together, leaving only a small area of raw surface. This with a little care can sometimes be inverted and the surface left smooth. The bladder is now dissected from the liver, beginning at the fundus and working down to the cystic duct. Sometimes there is bleeding, but it is seldom troublesome. The duct and vessels are clamped either separately or together, depending on the size of the stump. The mass then is ligated with strong catgut by a fixation ligature. This insures a non-slipping of the ligature with subsequent hemorrhage or leakage.

The abdomen is now closed with catgut sutures in the peritoneum and fascia and with dermatol in the skin. As there is no evidence of bleeding and we have enough faith in our ligatures we do not insert drainage.

Let me repeat some of the dangers of an operation which seems at times a very simple one but which always carries with it very serious possibilities. Hemorrhage either in the bed of the spleen where it may be profuse from adhesions and very difficult to control or from the pedicle where the ligature is not securely tied and reinforced. This may occur at once before the abdomen is closed or it may come on after the patient has returned to his room. In either case it will probably produce serious results because of its severity. Walker has recently reported a fatality on the second postoperative day from hemorrhage from rupture of an esophageal vessel. Clamping the tail of the pancreas is an easy matter if one is not careful for this organ at times comes into close contact with the spleen. A third and very serious complication that can neither be foreseen nor helped when it does occur is an ascending thrombus of the splenic vein. It invariably proves fatal when it reaches the portal vein if not before. This case is one of splenic anemia before the spleen has greatly enlarged and before other secondary symptoms have appeared.

Case II — Another case of this disease with enlargement of the spleen and hemorrhages is the following. On March 17, 1924 G. D. fell about 6 feet from a scaffold and struck on a radiator on his left side. He was unconscious for about ten minutes. Following this he had a good deal of pain in the left side of chest on deep breathing. On March 22d he consulted Dr. J. G. Carr who found no evidence of internal injury or of fracture of the ribs but strapped up his side and advised radiographic examination. The radiograph showed no fracture of the ribs. Following this he seemed to be losing strength and to be growing pale. His weight was 105 pounds. On August 12th he had a bad toothache and went downtown to have the tooth extracted. On the way home after getting off the car he had two vomiting spells.

of a large amount of bright red blood, which made him very weak. He went to bed for three days, got up to eat supper, and immediately after had a third severe vomiting spell with bright red blood. Dr. Carr was called, and on examination found the spleen about three times its normal size. There was no evidence of gastric ulcer or gastric tumor. He was removed to the South Shore Hospital where I saw him for the first time.

He was kept on a liquid diet for a few days. Blood examination revealed 2,500,000 red corpuscles and 3500 white corpuscles. Wassermann test was negative. All week he had slight hemorrhages, and on August 23d we did a blood transfusion, following which he was so much improved in strength that on August 28th we decided on a splenectomy on the diagnosis of Banti's disease. Recovery from the operation was very fine, although his pulse kept above 100 and he had some fever. September 7th, nine days after operation, he had a thrombus in the left arm. This was accompanied by extreme pain, tenderness, swelling, pallor, coldness, and fever. On the 21st when the arm was beginning to improve, he developed a phlebitis in the left saphenous vein, with pain, swelling, fever, and leukocytosis. On September 30th his blood count was 3,500,000 red corpuscles and 13,000 white corpuscles. He was removed to his home where he convalesced rapidly. He remained away from work for a year, as he was regaining his strength rather slowly. In the fall of 1925 he developed a bronchitis which gave him much distress. On September 24th his blood examination showed 5,880,000 red corpuscles, 90 per cent hemoglobin, 10,200 white corpuscles, with a differential count of 57 per cent polymorphonuclears, 20 per cent small lymphocytes, 12 per cent large lymphocytes, and 1 per cent eosinophils. Poikilocytosis was marked in some cells, many red cells were shrunken. During 1926 he was not so susceptible to colds and completely regained his former strength and weight. Blood examination on January 24, 1926 revealed 5,536,000 red blood corpuscles, hemoglobin 75 per cent, 14,350 white corpuscles, with a differential count of 58 per cent polymorphonuclears, 18 per cent small lymphocytes, 23 per cent large lymphocytes, 1 per cent eosino-

phils color index 0.68 and plates 252,000. He is now working daily at his trade of carpenter, feels well, has no discomfort and has quite recovered from the bronchitis.

Banti's disease may be divided into three stages. In the early one we find the evidences of enlargement of the spleen due to the splenitis and the perisplenitis accompanied by a leukopenia. In the second we find the former symptoms plus a tendency to hemorrhage and in the third there is definite evidence of liver enlargement accompanied by ascites. If we are to expect results from operative work we should get these cases for surgery before the third stage and before there is a serious hepatic involvement. In any case in which excision is contemplated there should be a thorough course of raying before operation. This will decrease the size of the spleen and reduce the danger of hemorrhage and shock to the minimum. If there has developed an ascites it is necessary to supplement the splenectomy with some operation such as a Talma in order to relieve the portal circulation of some of its load by the production of a secondary circulation through the omentum and the abdominal wall. Of the splenomegalies Banti's disease has been the one where excision after raying has been accepted generally as the best course to pursue. In recent years other of the splenomegalies have been receiving more attention with a view to producing more favorable and lasting results than those given by the x-ray, radium or by medication. One of these is pernicious anemia. As the splenomegaly in those cases appears to be a work hypertrophy from taking care of the old, diseased and weakened red blood corpuscles I do not feel that the excision is a wholly rational one. The only reason for removal here is that those old cells which are so plentiful in this anemia have opportunity for a longer life if the spleen is absent. They may help as oxygen carriers even if not the best and thus aid in the nutrition of the body where there is a scarcity of good healthy cells. I have 1 case where after transfusions, excision of the spleen, gall bladder and appendix, more transfusions and x-ray for accessory spleens the patient is alive after five years. Cord lesions have developed and the patient is a cripple although

at the present she is able to be about with considerable help. The large amount of work by Percy and others on this condition warrants the hope that something will develop as a result to bring relief in a condition that has been considered hopeless. Perhaps the most important factor is to get these cases before infection has become so implanted as not to be possible of elimination or before such damage is done that there is little or no hope of recovery even if the focus is eliminated.

Our conceptions of the function of the spleen have been largely limited to three chief and two rather minor ones. These are

- 1 The production in infancy of red blood corpuscles and later the production in the malpighian corpuscles of lymphocytes and of myelocytes by the endothelial cells of the splenic pulp. Pearce has shown in his work that there is a distinct retardation in the restoration of red blood corpuscles in adults in splenectomized animals. Some clinical workers state that splenic pulp fed to patients helps to correct anemia evidencing that the spleen probably has some function to perform in the production of red blood cells in adult life.

- 2 The ingestion and destruction of bacteria circulating in the blood stream.

- 3 The ingestion and transformation of old and weakened red blood corpuscles which are passed on to the liver for disposal either for elimination or the storing of the iron. Sometimes the spleen itself stores some of the iron to be used later in the supply of hemoglobin. This is a part of the work of the reticulo-endothelial cells assuming the functions of myelocytes.

- 4 The influence on the production of gastric juice which is decreased after splenectomy for a time.

- 5 The endocrine balance which may be disturbed by splenectomy. Animals in which the thyroid has been removed after a splenectomy quickly die.

Clinical as well as experimental work is broadening our views on these functions. It is more than probable that in the near future we will find that of the reticulo-endothelial system the spleen is the first organ affected and that the liver, lymph nodes, bone marrow and others are only or largely secondarily

affected I say this is indicated at least clinically, by many of the cases operated early. Take for example myelogenous leukemia. It is an accepted fact that those cases treated by radiation alone experience relief of the symptoms for a short period only and even during this period they are only comparatively well, that those cases which are excised before the late secondary severe symptoms develop not only have an extension of life expectancy but they have a much greater degree of comfort during this period and a nearer return to normal. The most reasonable explanation of such a result is that the spleen is primarily affected that in it a toxin is developed which either produces an irritation in the other reticulo endothelial organs or stimulates the irritation already started coincident with that in the spleen. When the spleen is excised this toxin is removed and relief is produced. Many of them die soon after operation possibly due to a lack of understanding of the toxin and consequent failure to properly handle the case. Mayo has recently reported a successful and satisfactory result in a case of polycythemia vera. This patient is alive at the end of four and one-half years. Here again we are at a loss to explain except on the basis of a stimulating toxin produced by the spleen. Of all the splenomegalies this is a disease in which an excision of the spleen is contraindicated because of the function as remover of the excess of blood cells. Following the removal a distinct drop occurred in the red cell count. Was it a coincidence or because of the removal of a toxin not previously recognized? The results of experimental work on normal animals are no more uniform than those on the diseased humans and it is difficult or impossible to draw definite conclusions. In many of the conditions we will have to wait for many more cases before we can hope to classify and formulate conclusions.

TWO CASES OF MYELOGENOUS LEUKEMIA ONE TREATED WITH x RAY AND ONE OPERATED

The following case is somewhat characteristic of those myelogenous leukemias that take radiation as their line of treatment

Case I—Mr E V was referred to me for a tumor in the left side of the abdomen. It was not tender but the size and weight were distressing. Along with this he had lost weight, strength, appetite, and had diarrhea. He was not cachectic or jaundiced although the skin was muddy. On examination I found the spleen enlarged to fill about half of the abdomen. The blood count showed 3 700 000 red corpuscles, 18 300 white corpuscles with a differential count of 55 per cent polymorpho-nuclears, 2 per cent small mononuclears, 3 large mononuclears, 4 per cent transitionals, 37 per cent myelocytes and 2 per cent basophils. On the first appearance of the tumor one year ago he was given x ray treatments without success, possibly for the reason that the x ray was not given in full therapeutic doses.

We made a diagnosis of splenomyelogenous leukemia and advised x ray treatments until the tumor decreased in size. To this the patient reluctantly consented. In September 1920 he was rayed with excellent results, the spleen decreasing in size until it was barely palpable. He felt so well that he decided to go home and if he began to get worse to come back at once. I did not see him until July 1921 when the spleen was found greatly enlarged and he was unable to continue with his work. He was rayed then and again in November but not with as good result. In January 1922 he returned with a white cell count of 274 000 and received a series of treatments during which the white cells decreased to 125 000. He returned in May and again in July with a white count of 167 000 and complained that he could not do his work as a farmer. The next time I saw him was at his home in October when he was a mere skeleton, having lost weight very rapidly. His liver was enlarged but the spleen was not as large as on previous occasions. He begged for operation which he had previously refused but I did not then consider it a case for surgery. I heard later that he was taken to a hospital and survived an exploratory laparotomy a few days.

This man lived some three years from the time of his first symptoms and about two years after his first x ray treatment. The most of this time he was far from being in good health and

a few weeks after an operation for an acute mastoid. This also improved under treatment. Shortly after this he noticed that the left eye was watering so much as to bother him in his work and with this there was a swelling of the upper lid and a gradual protrusion of the eyeball. He visited one of our clinics and a thorough testing of blood and microscopic examination of a gland from the neck he was diagnosed as a lymphosarcoma with probable metastases in the orbit.

He is at present apparently in excellent health of normal weight and strength. His appetite is good and his bowels are regular. Within the week he has noticed the left eye watering and swelling some. Fluoroscopic examination of the chest indicates a mass in the mediastinum. It would seem that this man has a Hodgkin's disease of slow development and the question that is bothering him is how long this condition is going to last before he loses his eyesight or whether x ray can safely be applied in the region of the eyes and if so what result can be expected from such treatment in this location. It is interesting to note that what seemed a case of splenic anemia should develop into a case of Hodgkin's disease with still enough doubt of the diagnosis that it has recently been pronounced one of lymphosarcoma.

A consideration of these cases and those in the literature indicates the need of adding to our accepted functions of the spleen others that are of a purely chemical nature that are not as yet understood. That when these functions are disturbed there is formed one or more toxins that have a disturbing effect on the hemopoietic tissues producing in them dysfunction of different sorts. In one type the action is on the bone marrow with a resulting stimulation and the overproduction of red blood cells—polycythemia in another a destruction of the red blood cells the anemias in another a stimulation of the whole reticulo endothelial system with an increase of the myelocytes—the leukemias and in another the reduction of the leukocytes with changes in the blood vessels making possible hemorrhages—Banti's disease. On this theory we can explain the production of the various diseases and also the improvement that so often follows the removal of the spleen.

CLINIC OF DR IRVING F STEIN

MICHAEL REESE HOSPITAL

TORSION OF THE UTERINE ADNEXA

Case I—The first patient I will present to you today is one whose history is unusually interesting. A young woman thirty one years of age widowed four months drove her car from Chicago to Detroit on July 13 1926. Toward the end of the trip she suddenly felt a pain in the right side of her abdomen. She continued her journey even though the pain continued and was becoming more severe. When she reached her destination at the home of a relative the pain was knife like in character in both upper and lower right quadrants of the abdomen and radiated to the back and to the groin. She also noted numbness in the right leg. Vomiting occurred six hours after the onset of the pain and was repeated many times during the day. A nearby physician was summoned. He found the patient in a highly nervous state and after listening to her history and making an external examination declared that the patient was not suffering from appendicitis which the patient herself had feared was the trouble and in response to her query assured her that she could return safely to Chicago. He advised her to consult a competent psychiatrist when she arrived there.

The patient remained over night and took a morning train back to Chicago arriving in the mid-afternoon when I was called to see her. After considering her history carefully I examined the patient's abdomen and found the right lower quadrant rigid especially near the pubes. No mass was felt in the abdomen. Upon vaginal examination however a fist sized tender mass was readily palpable to the right of a normal sized uterus which was very tender and apparently immobile. The left adnexa was apparently uninvolved. The patient's temperature was 99.1° F.

pulse 96 and the leukocyte count was 17 700 with polymorpho nuclear preponderance. The hemoglobin was 80 per cent and sedimentation time thirty-five minutes. The urine contained a faint trace of albumin but no other abnormality.

The diagnosis of torsion of a right ovarian cyst was made and the patient was sent to the Michael Reese Hospital. She was extremely fearful of surgical intervention and in order to convince her of the presence of the tumor a transabdominal pneumoperitoneum was induced. The films corroborating the diagnosis by showing a cyst like mass to the right of the uterus. The left ovary appeared normal on the roentgenogram. The patient was now relatively free from pain and believed her attack over therefore her family urged that we delay operative intervention and re examine her on the following day. Her condition was apparently improved in the morning but I nevertheless advised operative treatment for the mass was still present in about the same condition as on the evening before. Dr J. E. Lackner was called in consultation. He concurred in the diagnosis and urged that immediate section be made.

Operation—Under scopolamin morphin and ethylene oxygen anesthesia the abdomen was opened by a median incision. A quantity of free blood was found in the peritoneal cavity and upon exposing the right adnexa a complete twist of tube and ovary close to the uterine corner was found. Both tube and ovary were black in color and greatly swollen. The ovary was the size of a baseball appeared solid with bloody infiltration and had split in half as though cut with a blunt instrument. It looked in the gross very like an ovarian pregnancy. No ovular structures were found however and as will be seen in the microscopic report none were present. Considerable thickening of the broad ligament beyond the twist suggested that thrombosis had already taken place. The damaged adnexa with as much of the altered broad ligament as possible were removed with cornual excision of the tube and closure was made without drainage.

Pathologic Report—Grossly the specimen consists of three large masses of dark red hemorrhagic tissue. The largest is

9 by 5 by 3 cm. Attached to it is a thickened hemorrhagic tube whose fimbriae are swollen and dark red. The other two pieces measure respectively 7 by 4 by 2 cm. and 3 by 2 by 0.5 cm. and are covered in part by a fibrous capsule.

Microscopic—The mucosa and wall of the tube are thickened by free blood which completely hides the original tissue elements. In the wall of the tube a few gland like spaces surrounded by smooth muscle can be recognized. In places the hemorrhagic tissue is infiltrated by leukocytes. The rest of the material consists of blood covered by a thin fibrous capsule the ovarian origin of which is no longer recognizable (O. T. Schultz).

The Pathologic Diagnosis—Hemorrhagic infarction (strangulation) of tube and cystic ovary.

There is some question in my opinion whether there was an ovarian cyst present or not and whether hemorrhage into the ovary as a result of a slowly developing complete strangulation of the adnexa does not explain the whole picture. The absence of positive knowledge of the presence of a cyst before torsion and the complete replacement of ovarian tissue by the hemorrhagic infarction influences my belief that there was no cyst. The fact that the tube and ovary were jointly involved in the twist which was close to the uterine cornu and that no pedicle was found further strengthens this belief. The additional fact that the ovary was found literally fractured in half and appeared solid retaining its hemorrhagic content also indicates a solid rather than cystic ovary.

The patient made a rapid and uncomplicated recovery and left the hospital on her twelfth day.

Post-operative examination five weeks after operation revealed the uterus and left adnexa normal and the patient in good health.

Case II—The second case is that of a married woman twenty-seven years of age whom I saw on October 12, 1926 at 9 P. M. She suddenly experienced severe abdominal pain associated with vomiting thirty-six hours previous to my visit. For the past twelve hours she was comparatively free from pain when lying quietly in bed but complained of a sense of weight

and soreness in the lower abdomen upon shifting position and upon going to the toilet. She gave the history of having had several similar attacks of pain in the past few years none of them however as severe or lasting as long as the present one.

Upon examination the abdomen was found to be soft and free from acute tenderness but upon deep suprapubic pressure there was some pain. No mass was felt externally.

A bimanual examination revealed the uterus anteverted with a firm smooth tender mass about the size of a grape fruit lying behind the uterus and extending to the right pelvic wall. The left adnexa appeared free. Temperature was 99.8° F pulse 88 white blood count 10,400 with preponderance of polymorphonuclear leukocytes. The sedimentation time one hour fifteen minutes. The diagnosis of a twisted ovarian cyst was made and the patient was sent to the Michael Reese Hospital where she arrived about midnight. At 7:30 o'clock in the morning a laparotomy was performed.

Upon opening the peritoneal cavity a quantity of blood stained fluid escaped. A cystic tumor about 10 by 12 cm to the right of the median line and behind the uterus was found which appeared to be a dermoid tumor of the right ovary. The tumor was mottled and purplish in color and spread out on its surface was the swollen discolored fallopian tube. Both the tube and the dermoid as well as the broad ligament revealed thromboses consequent upon the recent twist. Retorsion had occurred. The right infundibulopelvic and broad ligaments were clamped below the thrombotic area and the adnexa were removed the tube being excised from the uterine cornu. It was also found that the tip of the vermiform appendix lay in contact with the cyst and that considerable congestion appeared at the point of contact therefore the appendix was removed. The patient made a rapid and uncomplicated recovery and was discharged from the hospital on her twelfth day.

The pathologic report in this case was

Gross Ovarian cyst and fallopian tube measure 9 cm. The whole ovarian cyst is discolored and infiltrated with hemorrhage. The walls of the ovarian cyst are filled with clotted blood. The

lining epithelium is quite thick, and scattered over it is some gray soft material in which are embedded a few hairs. At the hilus there is a thick soft, fatty mass partly sebaceous also containing some hair and teeth. *The vessels in the tubo-ovarian ligament are thrombosed.* Appendix is slightly injected 5 by 5 cm. Serosa is smooth. Nothing abnormal about the lumen, except it is filled with fecal material and the mucosa is thin.

Microscopic. The ovarian cyst is lined by a thin layer of epidermis the superficial layers of which are cornified. Beneath the epidermis embedded in fibrous tissue are sebaceous glands a few hair follicles and numerous sweat glands. Pathologic diagnosis: Hemorrhagic infarction of fallopian tube and dermoid tumor of ovary. Healed catarrhal appendicitis.

Postoperative examination one and two months after operation revealed the uterus and remaining adnexa in good condition. No infiltration or other abnormality in region of the scars. The second case presents the more usual condition for torsion, namely an ovarian dermoid exhibiting the less frequent phenomenon however of retorsion or spontaneous restitution.

Let us consider this morning the phenomenon of torsion as applied to the uterine adnexa. As a complication of tumors of the ovary torsion occurs from 8.5 to 15 per cent. Any tumor of the ovary which is not bound down by adhesions says Jellett, and which has a definite pedicle may undergo rotation. Right-sided growths usually turn from right to left and left-sided growths from left to right. In both cases the rotation tends to carry the part of the tumor lying anteriorly toward the median line. This rule called Kullner's law applied in 85.7 per cent of cases according to Piannenstiel.

As ovarian cysts grow they tend to rise out of the true pelvis. A 90-degree twist is not at all uncommon during this development and this amount of torsion of the pedicle causes no harm. However with an increase in torsion to 180 degrees serious symptoms occur. Sometimes the pedicle acquires four or five twists and as high as twenty-five twists have been recorded according to Schroder who says that when a cyst has once twisted 360 degrees other twists double occur easier.

The damage done by torsion depends upon the speed and extent of the twist. If the veins alone are shut off in the pedicle and the arteries continue to pump blood into the tumor until all the tissues beyond the twist become distended and infiltrated with blood, spontaneous rupture may occur. This is well illustrated by our first case. With continued or additional twists the arterial pulse is also stopped, causing ischemic or hemorrhagic necrosis and even gangrene. This may be followed by decomposition or suppuration. Sometimes, however, adhesions form between the necrosing tumor and the omentum or mesentery and new blood supply is thus imparted to the tumor, which may maintain it for a time. Wandering tumors (especially myomata) are thus produced. A loop of intestine has occasionally been encircled by the tumor.

The symptoms produced by torsion vary according to whether the twisting occurs suddenly or slowly. When the twisting is slow the symptoms may be insignificant slight pain and soreness being present for a few days, with increase in size of the tumor, and with the occurrence of retorsion the symptoms subside. This undoubtedly occurred a number of times in our case of twisted dermoid before the last and more complete twist. When a twist occurs rapidly and is complete the picture resembles that of acute peritonitis. Sudden severe abdominal pain accompanied by vomiting, a soft rapid pulse, distention and even high fever and collapse may occur. Ileus like symptoms frequently occur, but true ileus is rare. If the tumor ruptures, the picture is further modified by intraperitoneal hemorrhage and the resultant anemia. In the absence of rupture or of infection the acute symptoms soon subside, only to return again if the tumor is not removed. Repeated attacks are common. If the tumor has become necrotic, a septic peritonitis is most likely to develop. Even if adhesions to the omentum and bowel occur, and the acute symptoms gradually abate, the tumor may become secondarily infected from the bowel and may lead to a suppurative peritonitis. While the torsion is most common in the presence of a tumor—especially a cystic tumor—of the ovary, it may also involve a relatively normal adnexa and even

the fallopian tube alone may be involved. Dorner reported a case in which a normal fallopian tube was twisted three and a half times in a girl of thirteen years of age and he found 6 additional similar cases on record occurring in nullipare. The causes of torsion are more or less obscure. Trauma such as blows or falls, coughing, straining horseback, athletics, strenuous manual labor, peristalsis of the bowels, bladder filling, twisting or twirling while dancing are some of the causes given. Unequal growth of different portions of the tumor tends to favor torsion. During pregnancy, and especially in the puerperium torsion is likely to occur and when it does infection is especially likely. Fetal motion and the upward growth of the uterus may be etiologic factors. Dermoids most frequently become twisted and especially when they are bilateral.

The diagnosis is usually not difficult to make as the symptoms are ordinarily typical. Even when occurring in young girls twisted ovarian tumors are usually correctly diagnosed. When the diagnosis is confusing the abdomen is usually explored for a supposed acute appendicitis or ruptured tubal pregnancy and the correct diagnosis is established at operation. The temperature and blood picture are of little value in differential diagnosis but the sedimentation rate of the red blood cells is of some diagnostic and prognostic value. In the early acute attack of torsion the sedimentation time may show but slight increase in rapidity, but with necrosis or infection of the tumor, or acute anemia from intraperitoneal hemorrhage, the rate will be greatly increased. In our first case a sedimentation rate of thirty five minutes indicated that considerable damage had been wrought by the twist. In the second a rate of seventy five minutes indicated less damage or as the operative findings revealed restitution had occurred and circulation had been re established. It is rather interesting in connection with the differential diagnosis to note that in tubal pregnancy, as in early normal pregnancy the sedimentation time is two hours or over—a fairly normal rate. However, should marked hemorrhage occur the rate is proportionately increased.

of uterine myoma was made and a supravaginal hysterectomy was performed. Upon section the tumor proved to be a large submucous growth which was yellow in color translucent and soft suggesting in the gross a degenerated fibroid or a sarcoma.

Pathologic Report—Description (Gross) Fibroid uterus. A uterus which is amputated above the cervix comes to the laboratory laid open and contains a large intramural tumor which is also laid open forming two half spheres each of which measures 8 by 5 by 4.5 cm. The uterine muscle is thin and soft. The uterine cavity is contorted and the tumor whose uterine surface is covered only by a thin layer of myometrium is of a yellowish soft gelatinous appearance and is apparently edematous. It is composed of interlacing fibers. The endometrium is in places hemorrhagic. The myometrium is retracted from the tumor.

Microscopic The section consists chiefly of closely placed cells which have mostly spindle or oval nuclei. These nuclei resemble those of the myometrial muscle cells but they are much thicker and mostly shorter. They are rich in chromatin and vary in size. Many are round. These appear to be chiefly cells which are cut crosswise. The latter are surrounded by a small amount of protoplasm while the spindle shaped cells have long protoplasmic processes coming from both poles. There are also many places where the cells are farther apart and separated by unstained areas. Here the protoplasm has in some cells a triangular or stellate shape with long processes which are sometimes branching. The tumor tissue is moderately infiltrated by lymphocytes and contains numerous thin walled blood vessels. It is everywhere well delimited from the myometrium covering it which contains an increased number of vessels and is infiltrated by lymphocytes. The endometrium is thin and atrophic and the glands are farther apart than normally.

Diagnosis Spindle cell sarcoma of uterus.

Postoperative Course—The patient made an uneventful convalescence and was discharged from the hospital twenty one days after the operation in good condition. The abdominal wound healed by primary intention.

The patient was seen three and four months after operation and was in good physical condition but has not been heard from since

Case II—The second patient was at the other extreme in age being seventy two years old the mother of 3 adult children but in spite of her age was extremely active and vigorous. A previous examination which had been made six years ago by Dr Ludwig Simon showed a fibroid the size of an orange. Because of the increase in size of a supposed fibroid in a woman of advanced age the diagnosis of sarcoma was made and the patient readily agreed to laparotomy. There was no complaint of bleeding pain or distress but the patient noticed the abdominal enlargement and having been told that she had a fibroid some years before returned for examination and advice.

On December 9 1924 under scopolamin morphin and local anesthesia with light ethylene-oxygen narcosis for closing pan hysterectomy was performed. The patient made a rapid and complete recovery and was discharged in good condition on her twelfth day postoperative. The pathologic report is of interest.

Gross Specimen consists of a greatly enlarged uterus measuring 15 by 13 by 12 cm from which two tubes with attached ovaries are pendant. The outer surface is smooth and glistening. It contains many dilated blood vessels and apparently encapsulated the organ completely. At the inferior pole there is an ulcerating yellow irregular depressed area, 5 by 4 by 3 cm. This suggests an endometrioma. On section it consists of a thick mass with varying sized nodular projections the largest measures 6 cm in diameter. These have the appearance of fibroids and on section are made of interlacing strands. The large mass of tissue has a granular irregular surface with a large central depression. A few cysts with smooth walls are present measuring about 2 cm in diameter.

At the lower pole it is brownish and necrotic in appearance. Many small irregular white nodules appear throughout and in places are papillary in structure and an irregular large cyst is also present.

Microscopic Section through the large mass described in the gross shows it to consist of lobule like arrangements of spindle shaped cells supported on a highly vascular stroma. In some areas there is a large amount of intracellular pink staining hyalin like material of these lobules. This may be the compressed remnants of original connective tissue. At one edge there is a definite encapsulation by compressed fibrous tissue. There are very few mitotic figures seen. In other sections through the same area the pink staining hyalin like material is more evident and in some places there is definite degeneration. In one particular instance the hyalin like material is arranged in a fan shaped manner between the spokes of which are numerous distorted nuclei. In another section the type of cell is more round and oval than spindle. These may be taken as a younger type of cell. Section through the yellow adjacent area seems to consist of a large number of round and old cells on a highly vascular framework. In this section there are numerous large ovoid or polygonal cells in clumps containing a small deeply staining irregular somewhat eccentric nucleus with markedly granular clear cytoplasm. They almost give the impression of primordial ova but they are presumed to be a type of fatty degeneration of tumor cells. Along the periphery tissue is markedly cellular and appears almost like ovarian stroma. Larger vessels are lined by hypertrophic endothelium. Another section through this area is represented by completely degenerated tissue while still another section is essentially similar to that through the large mass. Sections through the large and small fibroids show them to consist of tissue undergoing various stages of degeneration such as described in the first section. Sections through the tissue taken near the cyst show similar appearance with marked prominence of the vessel epithelium. The small nodule at the lower pole consists of similar degenerated and edematous material. It is felt that we are dealing here with a tumor which has arisen from the assumption of growth on the part of pre existing fibromyoma. Whether the tumor is myogenous cannot be definitely determined from the present section. In the light of our present studies we can only say that it is a fibroblastoma undergoing degeneration.

This patient has been seen regularly for the past two years and has remained entirely well. She has made several railroad trips to distant cities and feels that she is quite healthy and vigorous. She has gained weight and has shown no signs of recurrence to date. Both of these cases represent examples of the mural type of sarcoma each occurring at an unusual age for this class of growths. Sarcomata of the uterus occur most frequently between the ages of forty five and fifty years and show a sharp decline after this age. They are only about 1/40 as common as carcinomata of the uterus and occur in but 1 to 2 per cent of fibromyomata.

Except by microscopic examination sarcoma is difficult to diagnose, and even then is apt to be questioned. The symptoms are usually so similar to those of myomata that the diagnosis is usually made by the microscopic examination after removal of the tumor, at autopsy, or by the appearance of recurrence of fibroids. In our first case no symptoms suggestive of malignancy were present. The clinical picture could be accounted for entirely by the presence of submucous fibroids. In the second case however, even in the absence of bleeding or foul discharge, sarcoma was suspected because of definite enlargement of a known fibroid years after menopause. No ascites, cachexia, or other usual sign of malignancy was observed in either case. In neither case was the parametrium invaded, so that the prognosis is fairly good. Recurrence would be more likely to occur in our first case because of the age of the patient and the fact that the cervix and adnexa were left. However, we have failed in our efforts to trace this patient. In the second case the prognosis is good.

If the diagnosis is made of sarcoma of the uterus, the treatment should be a total extirpation similar to the Wertheim technic for cervical carcinoma, however, the permanent cures, according to Veit, are no greater than those of operable carcinoma. Recurrences are common locally, and the most frequent distant metastases are found in the lungs. Radiation therapy is not recommended in this variety of tumor.

ISTHMOSPASM OF THE FALLOPIAN TUBES

"ISTHMOSPASM" is the term introduced by Kennedy in 1925 which refers to the spasmodic occlusion of the proximal portion of the fallopian tubes, and is a significant factor, in the opinion of that author in sterility, dysmenorrhea, and antelexion. In the study of this phenomenon Kennedy utilized a sodium bromid solution as a radio opaque medium, and thus reawakened the interest in radiography of the pelvic viscera with contrast mediums. Forrestier and Sicard were using an iodized oil for similar Roentgen visualization not primarily for the study of spasm, however, but especially for the location of tubal obstructions. Since then numerous workers in this field have adopted iodized oil for pelvic Roentgen studies. In 1915 Rubin had used collargol for this purpose with unsatisfactory results, and last year he reported his fluoroscopic observations on tubal peristalsis in pathologically closed tubes with the use of iodized oil instillations.

The iodized oils have recently proved most valuable in roentgenographic diagnosis, being non irritating, radio opaque mediums, and are more or less extensively used in conjunction with other methods of gynecologic diagnosis. Chiefly in the study of sterility, where the question of patency of the fallopian tubes is doubtful, is the additional use of the liquid or oily contrast medium of diagnostic value. Rubin advises that it be used only where tubal obstruction is demonstrated by the patency test. However, other workers have adopted it more liberally in pelvic diagnosis, and we feel assured from our own experience that a wider application is not only safe, but valuable.

Many of the temporary obstructions encountered in the performance of the patency test with gas disappear under conditions which have led to the natural conclusion that they were produced by spasm. After reviewing the work published in

support of this view and illustrating with case reports and roentgenograms the basis for his own opinion Kennedy concluded that

1 Isthmospasm of the fallopian tube is one obstruction between the meeting of the ovum and the spermatozoa and may be the only obstruction preventing the passage of a fertilized ovum from the tube into the uterus—a predisposing factor in ectopic gestation

2 Isthmospasm is one condition that will explain selective sterility

3 Attenuation of the isthmospasm would explain most delayed conceptions

4 Isthmospasm exists in some women complaining of sterility or sterility and dysmenorrhea and is frequently associated with antelexion

5 Isthmospasm is caused by improper balance of the autonomic and sympathetic innervations the autonomic being in excess or the sympathetic being deficient

In the course of our sterility studies we have been using both the Rubin test for the establishment of tubal patency and the iodized oil instillation for visualization of the uterine and tubal lumens. Both methods have given us a great amount of satisfactory information concerning the integrity of the pelvic viscera. In the patients in whom tubal obstruction is apparent with the patency test the use of transabdominal inflation in addition to the iodized oil instillations has been most enlightening. With this combination of pneumoperitoneum and contrast filling the roentgenogram yields the greatest amount of information concerning pelvic viscera to be obtained without making use of surgical exploration. The following case will illustrate the utilization of these diagnostic procedures and will serve to illustrate at the same time the phenomenon of isthmospasm.

Mrs. B. K., aged thirty six, married six years, complaining of sterility, was referred to me for a patency test. The preliminary examinations were all reported negative and by Huhner's test actively motile spermatozoa were obtained from the

endocervix one hour postcoitum. Cervical smears were bacteriologically and chemically satisfactory.

Patency Test—With the usual technic already described in previous clinics, the patency test proved negative. The manometer recording 200 mm. on three separate trials with the gas flowing very slowly. Thereupon the abdomen was inflated by transabdominal puncture, 1 liter of CO₂ being introduced and in addition 5 c.c. of lipiodol was instilled into the uterine cavity. The pneumogram (Fig. 347) revealed practically normal uterus

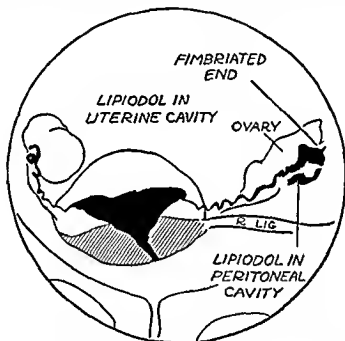


Fig. 347.—Patency test negative. Tubes apparently obstructed. Transabdominal pneumoperitoneum. Lipiodol fills both tubes and escapes from fimbriated end of left.

and adnexa and both fallopian tubes appeared filled with a small quantity of the iodized oil in the peritoneal cavity at the tip of the left tube. No sacculations, dilatation or strictures of the tubes were seen.

Upon summing up the results obtained we concluded that the tubes failed to permit passage of the gas in the patency test either because of the presence of kinks of the tubes, folds of the mucosa, or spasm of the isthmus portion of the tubes, and that

the oily liquid medium was more successful in overcoming this obstacle than was the gas. Hence we reasoned that the liquid or oily mediums may sometimes prove of value in demonstrating patency of the tubes when the test with air or gas is negative. This fact has proved to be true in a number of instances since then.

The patient remained under observation for a short while and then disappeared. Six months after her first test she was

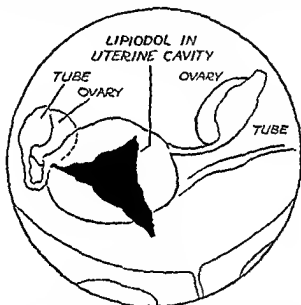


Fig. 348.—Same patient as illustrated in Fig. 347 six months later. Tubes patent to gas at low pressure. Transuterine pneumoperitoneum. Apparent obstruction at tubal corners shown by lipiodol instillation. Isthmus spasm.

referred to me again by another gynecologist whom she had consulted with his request for a repeated test, no pregnancy having yet occurred. At this time with the same technic and without the additional use of antispasmodic drugs, warmed gas or other means of overcoming possible spasm, the gas passed through the tubes readily at 60 to 80 mm. of pressure. Auscultation over the pubes on both sides revealed the typical intermittent dry rale like sounds of perturbation. In order to compare these

pneumograms with those obtained after the first test the abdomen was now inflated with a liter of CO₂ transuterinely and 7 c c of lipiodol was instilled into the uterine cavity. A larger amount of the oil was used this time to insure both tubes being completely filled and to observe spill at both fimbriated ends. This I agree with Q. Newell is necessary to establish the patency of both tubes. The pneumograms (Fig 348) however disclose just the opposite result from that obtained in the first test for whereas now the gas passed through the tubes readily the iodized oil is arrested at the tubal corners of the uterus and the triangular uterine cavity shadow alone is in contrast.

A series of three films was taken and in the last of the series exposed several minutes after the first shows the beginning filling of the isthmus portion of the tubes a fine thread like shadow being registered on the film. One can scarcely doubt the existence of spasm as an element in the production of these two apparently opposite results. Furthermore the second illustration proves that the spasm occurred at the tubal corners. The spasm is obviously short in duration and entirely disappears spontaneously. The use of antispasmodic drugs has proved useful according to Meaker in avoiding apparently negative tests in the absence of actual pathologic obstruction.

When we are able to hospitalize our patient for twenty four hours we carry out the following routine in order to eliminate the elements of both spasm and discomfort and to obtain most uniform results. The patient is given a quart of soap suds as an enema at least two hours before the test and then is given a hypodermic injection of morphine sulphate $\frac{1}{2}$ grain and scopolamine 1/150 grain about forty five minutes before the patency test. This renders the actual test easier by allaying the fears of the more timid patients and has resulted in a greater number of successful tests by eliminating the element of spasm. The patient is kept recumbent the greater part of twenty four hours and is quite comfortable as a result of the sedative and the posture. Under this management there is rarely a complaint of abdominal distress or shoulder pain as I found with the transient patients.

The interpretation of results from tests such as these is a most interesting study and often leads one to premature false conclusions unless the tests are carefully and properly evaluated. If the physician considers these diagnostic methods as a part of the greater gynecologic examination and does not place too great importance upon the result—even though a striking one—of a single observation many errors in diagnosis may be avoided. The possibility of spasm must be borne in mind and if the results obtained from the patency test indicate its presence in one or both tubes the tests should be repeated before concluding that an obstruction is present. We have previously shown (Stein and Arens *Radiology* June 1927) that one tube may fill with iodized oil and the other fail to fill even though both are patent. A unilateral spasm may account for such a result. Translating the results of these interesting tests into the treatment of the condition for which they were performed we must conclude with Kennedy that isthmospasm may be one condition that will explain selective sterility. Therapy then should be directed accordingly to eliminate the element of spasm. The usual antispasmodic drugs perhaps with the additional use of parathyroid extract administered for a week after the menstrual period during which coitus is avoided followed by a week of repeated coitions at the time when ovulation is believed to occur may result in greater success in this group of cases.

CLINIC OF DR GEORGE DE TARNOWSKY

DEPARTMENT OF SURGERY, UNIVERSITY OF ILLINOIS COLLEGE OF
MEDICINE

PRIMARY ECHINOCOCCUS CYST OF THE KIDNEY*

General Considerations—Even in parts of the world such as Iceland Sardinia Dalmatia Austraha Pomerania, and Mecklenburg where the *Tenia echinococcus* may be said to be indigenous the kidney is rather seldom primarily involved at least in the human being Aguirre¹ reports the case of an apparently primary hydatid cyst of the right kidney cured by nephrectomy The cyst was accidentally discovered while exploring the liver a preoperative diagnosis of hepatic echinococcus cyst having been made According to Aguirre his patient had presented no renal symptomatology of the disease Martin² aspirated through the rectal wall of a thirteen year old boy, a retrovesical hydatid cyst which was apparently not associated with any similar lesion of the kidneys Vegas and Jorge³ collected 11 cases of hydatid cysts of the bladder without mentioning the kidneys in any of them Verdet⁴ had a case which he classed as a parenephric hydatid cyst occurring in an eight year old girl Longo⁵ operated on a seven year old girl who had a kidney cyst the size of a child's head As there had been no urinary symptoms he was able to obtain a cure by removing the cyst, including one daughter-cyst and packing the resulting cavity with gauze Capogrossi⁶ operated on a rare case of suppurating hydatid cyst of the right perirenal region complicated by a subdiaphragmatic abscess and right sided pleurisy The perinephric abscess was drained of a seropurulent fetid liquid containing gas bubbles and fragments of daughter-cysts From the right pleura 1700 c c of serous exudate was aspirated

* Case presented before the Chicago Surgical Society, January 5 1927

Various authors place the incidence of hydatid cysts of the kidney between 1 and 4 per cent the majority associated with primary cysts of the liver Cinozzi⁷ reporting 62 personal observations and reviewing those found in Italian surgical journals gives the following percentages

	Per cent
Liver	65
Lungs	16
Spleen	8
Mesentery	4
Kidney	2
Pelvic organs	2
Muscles	1

Garceau⁸ in his exhaustive book on tumors of the kidney places the incidence of echinococcus cysts as 1 per cent or less and states that they are usually secondary to cysts in other organs Canevazzi⁹ reporting the rare case of an echinococcus cyst of the left ventricle in a steer makes the remarkable statement that in the stockyards of Modena Italy 12 per cent of all animals slaughtered showed hydatid cysts of the lung and only 6 per cent cysts of the liver

In the human race the ovules of the parasite enter the stomach where the gastric juices retard their development and in all probability destroy a majority of them According to Garceau the gastric juices dissolve the enveloping membrane of the parasite As soon as the ovules reach the duodenum the embryos are freed possibly from the action of bile Each six hooked embryo attaches itself to the intestinal wall penetrates it and eventually enters the lumen of a portal venule Unless arrested in the liver they are carried through the general circulation to various organs or tissues of the body to be finally arrested in some end artery On reaching its ultimate destination the six original hooklets disappear and a vesicular worm develops surrounded by a pericystic membrane which represents the normal reaction of inflammation of the organ in which the parasite is cradled It is therefore correct to speak of the invading host as having two surrounding layers—a capsule and an endocyst This constitutes the second or encysted stage of

the echinococcus. In the primary or mother vesicle daughter vesicles or cysts develop. Between the lamellæ of the cyst wall of the mother vesicle there is produced an accumulation of granules that is surrounded by a cuticle and thus becomes the center of a new system of stratification. While the number of strata increases, the cavity enlarges and the liquid content becomes clarified. If the daughter-cysts grow, the wall of the mother-cyst is distended by means of herniated sacs until it bursts and its contents are freed. It is, however, possible for the daughter-cells, like the primary mother-cell, to obtain an external connective-tissue capsule from the parenchyma of the invaded organ. The mother-cyst as it increases in size may contain a dozen or more daughter-cysts, inside which last again a similar process occurs and a series of third or granddaughter-cysts in time develop. From the lining membrane of each cyst brood-capsules arise by budding; these mature into scoleces or heads of the *Tænia echinococcus*, presenting four sucking disks and a circle of hooklets (Sajous¹⁰).

Etiology.—Echinococcus disease in the human family represents the cysticercus stage of development of the *Tænia echinococcus*, a parasite indigenous to the intestines of domestic animals, particularly the dog. It would seem to require two hosts—domestic animal and man—for its complete development.

The *Tænia echinococcus* is a worm $2\frac{1}{2}$ to 6 mm. in length, having both hooklets and suckers by means of which it fastens itself to the intestinal wall, usually in the first portion of the duodenum. In this stage of its development it has never been found in the human. The last segment of the worm contains the eggs, and this is periodically cast off and ejected with the animal's feces. As many as 5000 eggs per segment have been counted.

Dogs, in their investigation of feces of other dogs, sniff up the eggs and then lick their master's faces. Contamination of vegetables eaten raw, such as radishes, cucumbers, tomatoes, and lettuce, by dog's feces is also a common source of transmission of the eggs to the human gastro-intestinal tract.

The development of the cysticercus stage is extremely slow.

According to Marcé¹¹ from eighteen to twenty four months elapse between the fixation of the six hooked embryo in the lung and its first symptomatic manifestation

In the vast majority of cases reported in this country the parasite was acquired by emigrants in their native land. Clinical manifestations of the disease occur principally in early adult life—twenty to forty years. Mills¹⁷ has however collected the reports of 14 cases of echinococcus cysts in children in habiting North America. He very properly calls attention to the *clinical fact* that whereas the seeds of echinococcus are sown in infancy the extreme latency of the disease is responsible for the fact that the majority of these cysts cause no symptoms until the patient has attained adult life.

Men are more apt to be invaded by the parasite than women probably because the shepherd dog is their daily companion. Nevertheless Enrico Bussa Ley¹³ reports several cases of hydatid cysts of the female genitalia and quotes Benoit as having collected 83 similar cases with the following incidence

Pelvic cavity	61
Uterus	23
Ovary	3
Fallopian tube	1

In several of these cases both the uterus and pelvic cavity were jointly involved

Additional proof of the latency of the disease is brought forward by Garcia¹⁴ who found daughter cysts in only 23 out of 274 cases of echinococcus cyst in children, none of them in the lungs or kidneys

Diagnosis—Owing to the rarity of echinococcus cysts of the kidney the diagnosis will be in doubt unless the mother cyst ruptures into the pelvis of the kidney and daughter cysts are expelled in the urine. If—which is extremely rare—bimanual palpation of a kidney tumor gives the examiner the classical "thrill" produced by the rubbing together of daughter cysts, that single symptom should orient him in the right direction. Unless daughter cysts are found in the urine the chemical ex

amination of the latter will only reveal a moderate albuminuria and cylindruria, neither of which are of much diagnostic importance

The blood-picture and serodiagnostic tests will be of the greatest assistance providing the available laboratory technicians are familiar with the necessary technic. Eosinophilia is present in 80 per cent. of echinococcus cyst cases, the percentage of eosinophils varying between 7 and 40 per cent. This is caused by the toxins of the cyst contents mingling with the blood-serum, irritating the neutrophil leukocytes, and transforming them into eosinophils. Unfortunately eosinophilia is absent in cases where the cyst is dead, degenerated, or suppurative. It is frequently absent when the cyst has ruptured into the kidney pelvis, because in such cases the cyst content is eliminated with the urine without causing accentuated anaphylactic phenomena.

Of the serodiagnostic tests, the complement-fixation test of Bordet-Gengou is positive in 93 per cent. of echinococcus cases. This is only true when an expert technician is available. According to Cinozzi,¹⁵ the intradermal reaction of Casoni is also positive in 90 per cent. of all cases. Other less reliable tests are:

1. The precipitin test.
2. Myostagmin reaction.
3. Anaphylactic reaction, positive or negative.

Van der Hoeden¹⁶ believes that the hydatid antigen represents a lipoidal substance. Of 47 specimens of hydatid fluid obtained from man, horse, calf, sheep, and dog immediately after operation or slaughter, 36 gave positive albumin reactions (as high as 0.03 per mil.), 10 reacted to the Spiegler test, and only 1 was questionable.

Puncture of a suspected echinococcus cyst of the kidney is a dangerous procedure to carry out. Not only may the escape of the liquid content into the perinephric tissues give rise to severe anaphylactic shock, but daughter-cysts may also escape and proliferate de-novo in the retroperitoneal tissues. Cavina¹⁷ reports a case of retroperitoneal hydatid cyst arising between the folds of the transverse mesocolon. In the course of the operation he removed 1500 c.c. of fluid and then dissected the

endocyst without spilling any of its contents. The sac wall or true capsule was then closed by interrupted catgut sutures and anchored to the parietal peritoneum and rectus fascia. When such a closure is water tight intra abdominal pressure is sufficient to keep the walls of the empty sac in apposition (reduction sans drainage of the French school).

The Roentgen ray is uncertain in my own case the interpretation was absolutely negative.

In general the sequence of events is as follows.

A feeling of weight and uneasiness in the lumbar region lasting weeks or months followed by sudden attacks of severe pain radiating from the kidney toward the bladder and penis. The pain is not of the lancinating variety found in kidney stone. During such an attack hydatids scolices hooklets fat and oil particles albumin and blood may be found in the urine. There may be a septic fever of mild type. If the perforation of the cyst into the renal pelvis closes up the urine soon returns to normal and remains so until the cyst fills up again ruptures into the renal pelvis and the same train of symptoms is repeated. In the extremely rare cases where hydatids lodge and develop in the bladder one would expect to get the clinical syndrome of polyakurea stranguary retention and cystitis. Where the hydatid has not ruptured into the renal pelvis the physical findings can only enable the surgeon to arrive at a working diagnosis of cystic kidney.

The common site for the development of the cyst is at one pole of the kidney. Multiple cysts of the same kidney are of exceptional rarity. Its size will vary from a walnut to that of a fetal head. It may either rupture into the kidney pelvis or form adhesions with neighboring structures especially the diaphragm. These adhesions must be looked upon as the result of complete or partial rupture of the mother cyst. In the kidney substance the inflammatory reaction which always occurs around the mother cyst leads to the formation of an adventitia or ectocyst. This is formed by kidney substance and there is no line of cleavage so that attempts at enucleation or marsupialization are apt to be followed by an obstinate renal fistula.

Personal Case.—Case No 31,176, Ravenswood Hospital, Chicago M B, male, twenty-seven years old, married, street railway foreman Referred by Dr. A Biankini, Chicago Born in Dalmatia, where he lived on a farm surrounded—both indoors and outdoors as is the custom in Southeastern Europe—by poultry, dogs, and cattle Emigrated to the United States at

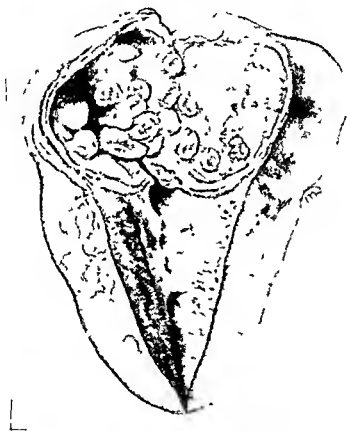


Fig 349—Echinococcus cyst of upper pole of kidney showing rupture into kidney pelvis

the age of seventeen. Shortly after settling in Chicago, ten years ago, he began to complain of vague pains and a sense of fulness in the left lumbar region, occasionally radiating toward the bladder During the past six years there have been recurrent attacks of dysuria with the passing of what the patient described as "grape-skins" or pieces of flesh with his urine.

Stranguria was at times very severe. During these paroxysms he noticed that his urine became reddish in color. Some of these attacks were accompanied by nausea and emesis ceasing as soon as the 'grape skins' had been expelled.

With the exception of these painful seizures the general health had remained excellent and he had not been obliged to give up his work. The family physician himself a Dalmatian having recognized the true nature of his patient's disease but wishing to confirm his findings referred him to one of the best city laboratories for radiologic interpretation. The laboratory report was as follows:

1 Renal. Portions of both kidneys are plainly visible by x ray shadows. These shadows indicate normal size, shape and position of these organs. No stone shadows are observed.

2 Ureters. The ureteral areas also are seen to be free from evidence of stone or other urinary pathology visible to the x ray.

3 Bladder. The bladder area contains no evidence of stone.

4 The bones and joints of the spine and pelvis represent normal x ray features.

A urinalysis made in the same laboratory showed a strong trace of albumin, acid reaction, many pus cells but no casts or red cells.

Examination. Robust adult male, height 5 feet 11 inches, weight 210 pounds. Does not look ill. Head, neck, thorax negative.

Abdomen. Liver. Lower margin barely palpable on deep inspiration. No increase of upper hepatic dullness on percussion. No areas of tenderness. No thrills obtainable.

Gastrointestinal tract. Negative to palpation, percussion and auscultation.

Right kidney. Not palpable.

Left kidney. Palpable as an enlarged indefinite mass, tender on deep bimanual palpation.

Spleen. Not palpable.

External genitalia. Negative.

Extremities. Negative.

Ureteral catheterization Right ureter, normal rate of flow no albumin, no pus cells

Left ureter Normal rate of flow, cloudy urine containing a trace of albumin many pus cells and a few erythrocytes

On entering the hospital the patient had three paroxysms of left lumbar pain radiating to the bladder followed by strangury and the passage of many "grape skins" The latter were unfortunately mistaken by the nurse for real grape skins and removed by her before sending the specimen to the laboratory The latter reported as follows

Specific gravity 1025 acid no albumin no sugar many epithelial cells occasional erythrocytes

Blood analysis Color index 85 per cent, reds 4 762 000, whites 10 250 no eosinophilia, Bordet Gengou complement fixation negative

Disregarding the negative x ray blood and urine laboratory reports a working diagnosis of primary echinococcus cyst of the left kidney was made and the patient prepared for operation

Operation May 3, 1926

Classical left lumbar incision

On reaching the perirenal fatty capsule its upper pole was found to consist of a dense mass of adhesions extending from the kidney to the under surface of the diaphragm In the process of loosening these adhesions a mother cyst the size of a large English walnut ruptured, it contained a number of daughter cysts Occupying the upper pole of the kidney and extending into its pelvis was a second cyst the size of an orange filled with daughter cysts and a clear lemon colored fluid Several small daughter cysts lay free in the kidney pelvis In view of the fact that echinococcus cysts of the kidney have no separate capsule—the inflammatory reaction which always occurs around the mother cyst leading to the development of an adventitia or ectocyst entirely formed by kidney substance—and that there is no line of cleavage nephrostomy was considered insufficient The free connection between the mother cyst and kidney pelvis made it certain that marsupialization of the former would result in leaving a protracted or permanent urinary fistula The

right kidney being normal it was thought best to sacrifice the lower pole of the left kidney and perform a nephrectomy. After double ligation of the pedicle and removal of the tumor mass and kidney the lumbar fossa was filled with ether in order to destroy any daughter cysts which might have escaped the eye and the incision closed leaving a small tubular drain extending to the bottom of the fossa.

With the exception of a sharp rise in temperature (103.4° F) which lasted three days and was undoubtedly due to protein absorption the patient made an uneventful recovery. For two days following the operation the urine contained from 6 to 18 daughter cysts per day—evidence that both left ureter and bladder were filled with them at the time of the operation. The sudden cessation of these daughter cysts rendered unnecessary any postoperative cystoscopy and the fact that the patient's urine has been free of them for over eight months is taken as clinical proof of the absence of hydatid cysts in his bladder. The latter are extremely rare. Lyon¹⁸ and Vegas and Jorge³ report such cases. A trace of albumin persisted for a week and then ceased. The patient was discharged from the hospital May 16th and has reported for monthly observation. The daily urinary output corresponds to that obtaining prior to operation. This is probably explained as being due to a gradual compensatory hypertrophy and hyperfunction of the right kidney during the past ten years. At present writing the patient considers himself in perfect health.

Conclusions—1 The rarity of echinococcus cyst in the United States tends to make a correct preoperative diagnosis of such a cyst in the kidney somewhat difficult unless such a possibility is borne in mind.

2 Echinococcus cyst of the kidney will be most frequently mistaken for hypernephroma or cystic degeneration. This is especially true if the cyst has not ruptured into the kidney pelvis.

3 The presence of daughter cysts in the urine is absolutely pathognomonic.

4 The presence of eosinophils and Bordet Gengou com

plement-fixation test, if positive, are very valuable diagnostic points

5 Marsupialization of the cyst or nephrectomy, if rupture into the kidney pelvis has occurred and the other kidney is normal, are the operations of choice

BIBLIOGRAPHY

- 1 Aguirre F S Hydatid Cyst of the Kidney, Nephrectomy, *Semana Medica*, 1924 *xxxi*, 1213
- 2 Martin A Retrovesical Hydatid Cysts *Siglo Med*, 1918, *lxxv*, 406
- 3 Vegas y Jorge Hydatid Cysts of the Bladder *Bol y trab de la Soc de Cirurg de Buenos Aires* 1911-14, *i*, 23
- 4 Verdet, L Hydatid Cysts in Children, *Gaz Hebd des Sci Med de Bordeaux*, 1913, April p 207
- 5 Longo, L Three Rare Cases of Echinococcus Cysts *Gior del' Acad di med di Torino* 1914, *lxxvii*, 36-41
- 6 Capogrossi, A Suppurating Echinococcus Cyst of the Right Perirenal Region, Subphrenic Abscess, Right sided Pleurisy, *Policlinico, Roma*, 1924, *xxxi*, 1130, 1131
- 7 Cinozzi O Clinical Contribution and Operative Technique in Echinococcus Cyst of the Liver, *Riforma Med*, Napoli, 1922, *xxxviii* 485-490
- 8 Garceau F Tumors of the Kidney, 1920
- 9 Canevazzi, E Two Echinococcus Cysts of the Heart in Animals, *Gior della R. Soc Vet*, 1906, *lv*, 125-132
- 10 Sajous *An cyc of prac med*, vol *v*, 109
- 11 Marci, B La diagnosi di cysti idatidea, etc, *Polic Roma*, 1923, *xxx*, 617-624
- 12 Mills, H W Hydatid Cysts in Children, *Surg, Gynec, and Obst*, May, 1926, pp 585-593
- 13 Lav, Enrico Bussa A Rare Case of Multilocular Echinococcus Cyst of the Ovary with Exogenous Proliferation, *Riv d Ost and Gin Prat Palermo*, 1925 *vii*, 201-206
- 14 Garcia, C L Hydatid Cysts in Children, Buenos Aires 1903
- 15 Cinozzi, O Renal Echinococcus, Clinical Study, *Archiv Ital di Chir Bologna*, 1923, *viii* 89-106
- 16 Van der Hoeden, J The Hydatid Antigen, etc, *Muench Med Wochen*, 1924, *iii*, 77
- 17 Cavina G Echinococco retroperitoneale etc, *Rif Med*, Napoli, 1924, *xi*, 749-752
- 18 Lyon, I P A Review of Echinococcus Disease in North America, *Amer. Jour Med Sci*, 1902, *ccxin*, 124

CLINIC OF DR J R BUCHBINDER

WESLEY MEMORIAL HOSPITAL

DIAGNOSTIC PROBLEMS OF EARLY CHOLECYSTITIS

CONTRASTING present methods of diagnosis of bile tract disease with those of twenty years ago we observe that in the latter instance such diagnosis in the absence of stones was unusual. At present we are chiefly concerned with the diagnosis in the precalculous period or the period of functional changes in contrast with the period representing the last half of the disease in which both functional and anatomic changes are present. Such terms as "stone", "colic", "common duct obstruction", "jaundice", "pancreatitis", "Courvoisier's law", "Charcot's intermittent fever" are not part of the nomenclature of early cholecystitis.

The first manifestations appear not in the fourth decade but in the second and third very frequently during the course of a pregnancy and are confused with other gastro-intestinal disturbances appearing during this time. These symptoms are grouped under the term "dyspepsia" and being unassociated with an organic lesion of the stomach is known as extragastric dyspepsia. During this early period of the disease which may be reckoned to correspond approximately to the first third or first fourth of the life history of the average case the gall bladder gives rise to no localizing phenomena which incriminate it as the cause of disorder but creates functional disturbances of the stomach and colon that frequently lead to a diagnosis of peptic ulcer or perhaps worse yet "colitis". These phenomena are so constant and so characteristic as to form the outstanding feature of the disease at this stage and when all is said and done a carefully taken clinical history furnishes the most valuable diagnostic criteria so far developed in gall bladder work.

The dyspeptic phenomena alluded to are belching gaseous distention weight and fulness in the epigastrium and a selective stomach. A heavy meal or such articles of diet as fried meats pastry coarse vegetables raw fruit and sour foods are the most common causes. The maximum relief is obtained from a light soft diet and alkalis frequently add a measure of relief. Hence the frequent temporary response to an ulcer regime. Heartburn nausea and attacks of pyloro-spasm are variable accompaniments and the latter may cause attacks of pain that simulate colic. Throughout the disease the symptomatology lacks the regularity in relation to food and periodicity of recurrence that characterize the course of ulcer. Of these symptoms belching and selectivity should be mentioned as being almost constant.

Physical examination too frequently furnishes little of any value in the diagnosis of chronic cholecystitis in the absence of a typical dyspeptic history tenderness over the gall bladder area must not be conceded too much weight particularly in hooked palpation under the liver. This statement does not apply to acute attacks of cholecystitis when the physical findings are quite definite and are of material aid in making the diagnosis.

It is rare for x ray examination unaided by cholecystography to offer positive findings in mild cholecystic disease. In these cases the chief value of radiography lies in the exclusion of other lesions of the gastro intestinal tract such as peptic ulcer or appendicitis although cholecystitis may coexist with either of these conditions. But whenever a gall bladder shadow may be seen on a plate it may usually be assumed that such shadow is due to thickened walls the result of long standing inflammation whether stones are present or not. Case, however has recently called attention to the danger of error in diagnosis in assuming that crescentic indentation of the duodenum or duodenal bulb are necessarily due to a pathologic gall bladder or that an elliptic shadow assumed to be the gall bladder necessarily indicates a diseased organ.

We have been surprised at the frequency with which a

positive Fouchet or Van den Bergh test for bilirubinemia or latent jaundice has been present in cases which at subsequent operation have shown normal common ducts and regard a positive result as offering valuable corroborative evidence

We come now to discussion of cholecystography which has had a place of outstanding importance in gall bladder literature during the past two years

The value of cholecystography as a diagnostic aid is inversely proportional to the chronicity and degree of pathologic change. It is of advantage arbitrarily to group cases with reference to the cholecystographic findings into the following classes

- 1 Long standing cases with stones or obvious gross pathology
- 2 Early or mild cases showing only functional changes
- 3 Early or mild cases with negative cholecystographic findings

The first group needs no discussion since little difficulty in diagnosis in this class of cases was experienced prior to the advent of cholecystography. The value of cholecystography in this group however is recognized in the occasional atypical case in combined lesions such as cholecystitis with ulcer or appendicitis and in the identification of doubtful shadows on plates as being associated with the gall bladder

In discussing the second group of cases it is necessary to emphasize that the important functions of the gall bladder are the concentration of bile by the absorption of water through its walls and the regulation of tension in the extrahepatic biliary ducts. A cholecystogram demonstrates function aberration either by showing a diminution in or loss of concentrating power of the gall bladder or in prolonged filling or emptying time. Such changes may usually be accepted as proof of gall bladder pathology. There can be no doubt that in this group of cases we are much indebted to cholecystography particularly in cases with atypical histories

In a recent monograph Graham calls attention to the fact that the degree of pathologic change necessary to produce functional alteration that can be detected in a cholecystogram may be so minute that such change can only be detected by